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ORIGINAL MEMOIRS.

THE OPERATIVE TREATMENT OF THE HYPERTROPHIED PROSTATE.

WITH SPECIAL REFERENCE TO ITS EVOLUTION, PRESENT STATUS, AND THE CHOICE OF OPERATIVE METHOD AND TECHNIQUE.

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THERE are so many modifications and slight changes of technique which are being put forward in the field of the operations for the relief of prostatic hypertrophy under the name of "methods," that it is of some importance to the student who approaches the subject for the first time to know which are the actual methods, which their modifications are, and where they came from. The following very brief sketch is therefore given as a preface to the subject-matter that forms the real body of this communication.

HISTORICAL REVIEW. SUMMARY OF OPERATIVE METHODS AND MODIFICATIONS.

1. Prostatotomy, or division of obstructing portions of the hypertrophied prostate, and partial prostatectomy by excision or partial removal of same.

(*a*) *Through the Urethra.*

1832. Leroy d'Etiolles. 1. Scarification and incision. (*Comptes Rendus des Séances*, Vol. iv, p. 551.)

1849. Leroy d'Etiolles. 2. Snaring middle lobe. By ligature carrier per urethram.

1836. Guthrie, the same. ("Anatomy and Diseases of the Urinary and Sexual Organs," London, 1836, pp. 23 and 25.)

These did not come into vogue, and no further progress of importance in the urethral operations was made until they were again advocated in 1856 by Mercier. Special instrument, the prototype of Bottini's. From Mercier dates the actual beginning of operations seeking to relieve or cure prostatic hypertrophy and its consequences. The next step is (1858) by Mercier, who suggests and does excise projecting median enlargements with a special form of prostatectome. (*Récherches sur le Traitement des Mal. des Org.-Urinaires, etc.*, 1856, p. 209.)

1874–77. Bottini introduces galvanocautery treatment by special form of instruments devised by him for the purpose. In 1877, galvanocautery incision by another form of instrument.

1897. Freudenberg modifies Bottini instrument.

1902. Young modifies Freudenberg's instrument by supplying it with blades of different sizes.

1904. Tenney exhibits instrument of a new form, allowing in a few cases visual application of cautery to prostatic obstruction. At meeting of Surgical Suffolk District Section, Boston, March 2, 1904.

(*b*) *Through the Perineal Urethra.*

Prostatotomy, partial prostatectomy, tunnelling median lobe, removal of same by forceps, snare, galvanocautery prostatectomes and incision of by galvanocautery instrument, puncture of by special instrument, etc.; also enucleations and removals by *morcellement* through this route.

1836. Guthrie (*op. cit.*). Division of median obstruction through this route.

1874–85. Gouley applies Mercier's incision and excision operations through the perineal urethra.

1883–84. Harrison advocates incision and tunnelling by the same.

1886. Belfield incises with galvanocautery instrument.

1888. Watson advocates excisions with galvanocautery prostatectome, and presents specially devised instrument for the purpose to be used through this or the suprapubic route.

1890. Wishard punctures with galvanocautery instrument.

1892. Norton presents a modified Mercier prostatectome to be used through this route.

1901. Chetwood presents a galvanocautery incisor to be used through the same route.

THE PERINEAL RADICAL OPERATIONS.

Enucleations and Morcellements, Total Extirpations through Various Perineal Incisions and by Variations in Technique.

Throughout the last century, surgeons in doing one or another of the perineal lithotomy operations have twisted, or bitten off, or enucleated with the finger obstructing masses of the hypertrophied prostate. These removals were infrequent, most of them were accidental; the rest incidental to, but intentionally done in course of the stone operations. So far as I can learn, the first deliberately planned removal of the prostate was done in 1867, when Billroth removed the whole gland for malignant disease through a median perineal incision, taking it away piecemeal. The fact of the malignant disease and not hypertrophy, does not seem to affect the character of the technical conception or the execution of the operation.

1870. Sir William Fergusson (London *Lancet*, January 1, 1870,), in the course of a lateral lithotomy enucleates a mass from hypertrophied prostate. He refers to the fact thus:

> "I have ventured to put on record what some of my professional brethren may have hesitated to do, from fear that they may have been

> guilty in performing their operations of perpetrating some rough mechanism not in accord with that nicety of manipulation which is thought so essential in the performance of the master handiwork in surgery,—lithotomy."

A complete and perfect recovery followed this operation.

1873. Gouley. ("Diseases of the Urinary Organs," by Dr. J. W. S. Gouley, New York, 1873.)

Gouley gives deliberately and clearly a formulated plan for the removal of the entire gland from the perineum, and, so far as I have found, is the first one to do so. He says:

> "The surgeon should endeavor to give permanent relief by a procedure which will not add greatly to the dangers of the preceding steps. (He has been describing a median perineal removal of the middle lobe.) He should first explore the prostate through the artificial opening (external perineal urethrotomy); and if he should discover a median outgrowth, or isolated tumors, he should dilate the prostatic sinus, or incise the prostate laterally, and enucleate the lateral tumors, or, if there be a median outgrowth, excise it; but the better plan is to remove the latter by means of a small wire écraseur, and then to introduce a large-sized, soft, vulcanized, India-rubber catheter, and retain it in position for two or three days."

1878. Bickersteth removes by enucleation in course of bilateral lithotomy a mass the size of a hen's egg from hypertrophied gland.

1881. Harrison repeats this experience by a similar operation ("Surgical Disorders of the Urinary Organs," 1887, Third Edition), and definitely advocates, as did Gouley, the systematic removal of the obstructing masses.

1882. Leisrink (*Arch. für klin. Chir.*, 1882, Berlin, xxviii, p. 578) does the first total extirpation, *en masse*, of the prostate, together with the prostatic urethra, for malignant disease of the gland, removing it through the crescentic, transverse, perineal incision of Celsus passing across the anterior margin of the anus. He approached and exposed the gland by blunt dissection, and removed it entire, together with the prostatic urethra, cutting the distal and proximal parts of the latter across. He succeeded in uniting the divided ends of the urethra by suture. The disease of the prostate was malignant, but the operation in its essential features and conception was that which has been from time to time reproduced under other names. The incision is, of course, that introduced nearly 2000 years ago by Celsus in his operation for the removal of stone, known as "cutting on the gripe." Leisrink's patient made an operative recovery.

The above may be considered as the tentative period of the operative treatment of prostatic hypertrophy by the urethral and the perineal methods, comprising a good many isolated instances of radical removals of the hypertrophied parts of the gland. Its interesting feature is that so many surgeons should have demonstrated the remarkably successful results of such procedures as well as their feasibility, and that their systematic practice should have been urged by three such able and widely known advocates as Gouley, Harrison, and Bottini without attracting more attention to the possibilities which they suggested to relieve this distressing malady. In consequence of the unwillingness of the profession to embark upon an extended trial of these operations, they had not then been done in sufficiently large numbers to allow us to utilize them as data from which to draw inferences that were at all authoritative.

1888. Watson demonstrates that in two-thirds of all cases the part or whole of the obstructing hypertrophies can be removed through the perineal route. One-third cannot, and urges again the proposition of Gouley, and also that the radical removals be more frequently undertaken. Advocates perineal route when possible, and when not, the suprapubic for the purpose, and perineal urethrotomy incision to explore, as first step in all cases.

1889. Zuckerkandl introduces an operation the essentials of which are those of Leisrink's operation.

1890. Dittel proposes a distinctly different incision of approach, viz., by a lateral incision extending from tip of coccyx to midpoint of the perineum, passing around one side of the anus. And that a wedge-shaped piece be taken from the posterior aspect of each lateral hypertrophy instead of removing the whole gland.

1890. Goodfellow begins systematic enucleation of the gland through perineal median urethrotomy incision.

1892. Pyle introduces similar operations.

1891. Wishard carries out Gouley's suggestion of intraurethral incisions and enucleation.

1895. Morris describes perineal method of removing the gland through a median incision not entering the urethra, and by incising the capsule of the gland in middle line and enucleating with finger or blunt dissector or by other appropriate instrument subcapsularly, very much in the same way as that described by some of the French surgeons in 1900 *et seq.*

In 1901, and the succeeding years between that one and the present time, various forms of "prostatic tractors," or, as the French term them, "desenclaveurs" have been introduced for the purpose of facilitating the performance of the removal of the gland in the perineal operations by pulling it towards the surface and holding it steady during the manipulations practised in the removal. These instruments are as follows:

1901. Albarran introduces a two-bladed desenclaveur, which is passed into the bladder through a median perineal urethral incision, the two blades being closed together; the latter are then separated by a mechanism in the handle's outer end, and traction is exercised by them upon the posterior surface of the intravesical portions of the hypertrophied gland. Albarran subsequently abandoned the use of this instrument.

1902. Parker Syms introduces a rubber balloon attached to the end of a handle. The balloon is passed into the bladder through the same channel as the last-named instrument, is then inflated with water, and traction is exercised upon the posterior aspect of the intravesical parts of the prostate by drawing upon the handle.

1903. Lydston introduces another form of branched tractor.

1902. Delbet (*Compte rendu de l'Assoc. Française d'Urologie*) introduces a single-bladed tractor. The blade is closed against the corresponding part of the instrument when introduced, then deflected into position.

1902. De Pezzer (*Ibid.*). A two-bladed tractor, to be used after the same manner as that described in connection with Albarran's instrument.

1902. De Pezzer (*Ibid.*). A combined tractor and galvanocautery incisor.

1902. Legueu introduces a double-bladed tractor (*Ibid.*).

1903. Young introduces a two-bladed tractor used in similar manner to that already described in connection with other similar instruments. (June, 1903, published and illustrated in the *Journal of the American Medical Association*, October, 1903.)

Other means of accomplishing the result of bringing the gland within reach in the performance of the perineal operations and of holding it firmly in that position have been numerous. Thus the way most frequently practised, and which has been in vogue by many surgeons for a long while in the performance of the perineal operations, has been to have recourse to the manœuvres employed in the classic operation of Celsus when cutting for stone from the perineum, and called "cutting on the gripe," namely, to hook down the prostate by the tips of two fingers passed into the rectum, and again by pressing down by the hand upon the abdomen immediately above the symphysis pubis, as advocated by Sir Henry Thompson in connection with digital exploration of the bladder in 1884. Guiteras in 1900 proposed to modify the suprapubic pressure by making it more directly applicable by means of an incision above the symphysis pubis down to but not into the bladder.

Still other means of making the gland accessible are the following:

1901. Albarran (*Compte rendu de l'Assoc. Française d'Urologie*, 1901) by the finger-tip introduced through a median perineal incision, and again by traction upon the cut edges of the capsule after it has been divided upon its posterior surface in performing the perineal operation as done in his manner of doing the operation.

1902. Murphy introduces hooks for the purpose of drawing down the gland.

In 1901 to 1903 and 1904 a variety of mechanical aids have been proposed to aid in the performance of the perineal operations. Thus:

1901. Albarran (*Compte rendu de l'Assoc. Française d'Urologie*, 1901) introduces retractors for opening the outer incision and giving a wide field in which to operate. In connection with one of them, he uses an adjustable blade which passes beneath the coccyx and part of the sacrum, and fixes the blade of the retractor which lies within the wound between the rectum and the prostate, and thus does away with the need of an assistant's hand to hold it in position.

1901. Proust (*Compte rendu de l'Assoc. Française d'Urologie*, 1901) introduces a frame by which the patient is held in a position similar to that gained by the use of the Trendelenburg table; but in addition to that position the patient's legs are spread apart and held attached to two uprights, thus giving free access to the perineum and having the pelvis tilted high in the air at the same time.

1902. Delbet (*Assoc. Française d'Urologie*, 1902). A similar device for separating the wound's edges, and giving free operative field by means of a retractor having two blades, and a sacral branch to fix it and retain it in place, in a similar way to that employed by Albarran.

1902. Loumeau (*Assoc. Française d'Urologie*, 1902) introduces another porte jambe device for placing the pelvis high and holding the legs. Also blunt dissectors and special forms of needles attachable to handle.

Between 1900 and 1904 there have been a number of carefully and accurately described manners of removing the gland from the perineum. In the main these operations are very similar. They differ in respect to minor detail. They have emanated chiefly from the French surgeons, beginning with Albarran in 1901. In America, in 1903, Young, of Baltimore, describes a similar manner of doing a perineal operation to those which have been devised in France.

The modern operations now coming into wider use seem to have been planned carefully by their advocates, but as a matter of fact they are all in the essential factor of the removal of the gland to be credited to Gouley, Leisrink, Billroth, later to Morris, whose description in 1895 is very close to that of some of the most recent perineal ways of doing the operation, and again Pyle and Zuckerkandl, in 1889 and 1892, trace most of the essential steps of these later methods.

The details of the following ways of doing the perineal operations will be found by consulting the articles referred to.

1901. Albarran describes his manner of removing the gland through a median capsular incision aided by the finger in the prostatic urethra used as a tractor, and the removal being effected by taking away the lobes a part at a time. (*Compte rendu de l'Assoc. Française d'Urologie*, 1901.)

1901. Proust (*Compte rendu de l'Assoc. Française d'Urologie*, 1901) describes a similar method of doing the perineal operation. Effects removal of gland lobe by lobe entire.

1902. (*Compte rendu de l'Assoc. Française d'Urologie*, 1902.) Similar operations are here described and illustrated by Hartmann, Legueu, Proust and Gosset, Pousson, Reynes, Le Fur, Escat, Loumeau, Dorst, and numerous cases are reported. Albarran gives the results, both immediate and remote, of his operations performed up to that time.

1903. Young (*Journal of the American Medical Association*, October 24, 1903) describes and illustrates a similar manner of operating to those referred to just above.

1902. Rydygier describes a similar manner to the above of doing the perineal operation, the point made by him being that of saving the prostatic urethra by means of clamping off with strong forceps the part of the lateral lobes lying adjacent to the urethra, after separating the other portions of each lobe in turn from the capsule of the gland by enucleation with the finger.

SUPRAPUBIC RADICAL OPERATIONS.

1827. Amussat removed the middle lobe with scissors by this route.

1880 to 1887 the operation was performed by Dittel, Trendelenburg, Belfield, Benno Schmidt, and McGill.

1887, *et seq.*, ably advocated and performed by McGill, of Leeds, England, to whom it chiefly owes its adoption and extended use. McGill enucleated the entire gland in two or more masses, describing its exposure through the intravesical covering over its surface. To Belfield and McGill the method properly should be credited.

1895. Fuller suggests counterpressure upon the perineum to bring the gland more easily in reach, and also to make perineal urethrotomy incision for drainage afterwards.

1899. Guiteras suggests the manœuvre of Pierre Franco for lifting up the bladder (utilized by the latter in suprapubic lithotomy and introduced by him about 1560) by pressure upward with two fingers in the rectum and by the thumb on the perineal surface.

1901, *et seq.*, Freyer advocates removal of whole gland in one mass from above symphysis instead of in two or more masses, and claims to do this without injuring or removing the prostatic urethra. Later says that removal of the prostatic urethra with the gland is not harmful.

COMBINED OPERATION.

1889. Belfield.

1894. Nicoll, through lateral perpendicular incisions through perineum, parallel with and not opening urethra, or median incision according to circumstances; enucleation aided by downward pressure from above through a suprapubic cystotomy incision; bladder covering of hypertrophied gland not opened, and urethra not injured.

1896. Alexander modifies by enucleating from within the prostatic urethra through median perineal urethrotomy incision, as suggested by Gouley: in connection with perineal operation aids in the removal by downward pressure through suprapubic cystotomy incision. The enucleated masses are removed through the perineal cut.

1899. Bryson suggests suprapubic counterpressure from above the symphysis through an incision down to but not into bladder.

1901. Guiteras suggests the same manœuvre. Bouffleur repeats Watson's suggestion to remove obstructing masses by this route by galvanocautery prostatectome.

INDIRECT OPERATIONS.

Castration.—1893. J. Wm. White (ANNALS OF SURGERY, August, 1893).

Ligation of the Vasa Deferentia.—1894. Mears, Bruns, etc.

Vasectomy.—1893. Harrison, etc.

Angioneurectomy.—1895. Albarran, etc.

Ligation of the Internal Iliac Arteries.—1895. Bier.

Prostatopexy.—1902. Delageniere. (Fixation of the gland in a new position after freeing it by incision, and dislocation of its lobes downward.)

Raising the Level of the Bas Fond.—1902. Hawley proposes reduction of the elevated neck of the bladder by incision of the posterior surface of the sheath of the gland, and after partially freeing the latter with the finger over its posterior aspect to excise portions of the gland from that part of it. (From the description, the operation seems to differ but very little from that of Dittel, except with respect to the form of the outer incision.)

1902. The Infrapubic Operation.—Andrews. By division of the puboprostatic ligament and the levator ani on one side, and resection of a part of the prostate above the urethra.

For the sake of convenience, the evolution of the operative treatment of the hypertrophied prostate may be divided into two periods,—the first being that which precedes 1890, and the second that which is subsequent to it. The former may be considered as the tentative or early part of its development, the latter as that of its activity and its establishment among legitimate surgical procedures.

It is not unprofitable to review very briefly the steps that characterize these two periods. The first goes back to the early part of the last century, and until 1856 may be said to have been marked by a few suggestions put forward tentatively, and looking to the performance of partial removals or incisions of the obstructing parts of the hypertrophied gland, and by the performance and reports of a few isolated operations in which a part of the gland was enucleated, or resected, or torn off, usually by accident in the course of the performance of lithotomies.

The first persistent advocate came to view in the person of Mercier in 1856, with whom the operative treatment practically speaking originated. (See historical summary.) The prostatotomy and resections of the middle lobe or of a bar at the neck of the bladder practised by Mercier through the urethra from the meatus were not, however, favored in France or elsewhere. It is chiefly to Gouley, of New York, and to Bottini, in Italy, that we owe the revival of interest in the subject; and I think it may be said perhaps the subsequent extension and progress also that have taken place since 1870, at which time there was no operative treatment of this condition in actual use. To Gouley is to be referred the first definitely proposed plan and clearly described method for total removal of the hypertrophied gland through the perineal route. (See historical summary.) To Bottini's frequent and earnest advocacy of his operation is due the preservation of the urethral operation of Mercier under a modified form.

One important step had been taken before this, however, namely, an operation for total extirpation of the gland for malignant disease through a median perineal incision and by *morcellement*, performed by Billroth in 1867. Another still more important one, but subsequent to Gouley's and Bottini's work, was the total extirpation of the gland for malignant disease through the transverse incision of Celsus in the perineum, and by enucleation of it in one mass together with the prostatic urethra, the divided ends of the urethra being united by suture, and the patient making a good operative recovery. This was done by Leisrink in 1882.

The next push in the right direction came from Reginald Harrison in 1884. (See historical summary.) A most important step in advance was next made by Belfield with regard to the suprapubic operation, and still more so by its being launched into favor and in the form of a more complete operation by McGill, of Leeds, under whose name it is or was, and should be, I think, known. Atkinson, Jessop, Mayo Robson, and Mansell Moullin quickly became advocates of this method and supporters of McGill's views. This was in 1887. At that time all radical operations were opposed by three very eminent authorities, viz., Sir Henry Thompson in England, Guyon in France, and Socin in Germany.

Maintaining the opposite opinion was the small number of surgeons named above; with these the writer associated himself, in 1888, by the publication of a monograph, in which he undertook to establish and demonstrate the following things:

1. That the advocates of the operative treatment in appropriate cases were right, and that those who opposed its application under *all* circumstances were mistaken in their opinions.

2. That no underlying rationale upon which to rest the choice of operation in individual cases had as yet been set forth by the advocates of the operative treatment, whose views as to the main issue he shared.

3. That a rational plan of action in this respect based upon scientific data could be furnished, and to do this was stated to be one of the principal objects of the work, and was undertaken by means of an anatomical and pathological study of the actual conditions presented by the various forms and characters assumed by the hypertrophied gland.

4. That the local conditions presented by the hypertrophied gland in individual cases should be one of the important elements in determining the choice of operation.

5. That two-thirds of all prostatic hypertrophies could be reached through the perineum, and either partly *or wholly removed through that route.*

6. That the remaining third could not, but could be removed through the suprapubic operation.

7. That the best way of determining whether they could or could not was by digital exploration through an external perineal urethrotomy incision made as the *first step* in all cases in which operation had been decided upon.

8. That, according to what was found to be the condition by this means, the operator should complete the operation through that channel, or by a suprapubic cystotomy, with the immediate performance of which the fact of having already made the trifling perineal urethrotomy opening in nowise interfered, while it *did* possess the advantage when it was found necessary to do the high operation of supplying better drainage in connection with it.

9. That when the perineal removal could be accomplished, it was the best one of the two to select, inasmuch as it was the safer.

10. The mortality of radical operations was shown to be at least 16 per cent.. The writer claimed that catheter treatment would show at least as high mortality as that of the operative treatment if the comparison were made of the two with patients who were in the same condition in each respectively.

11. That, unfavorable as the showing for the operative treatment was at that moment, with respect to mortality as judged by the meagre clinical data at hand, its improvement might be confidently expected.

12. That in the palliative suprapubic drainage operations, it was much safer to do a free cystotomy than to introduce a soft rubber drain through a cannula of a large trocar by which the bladder had been punctured for the purpose of inserting such a drain.

Partial prostatectomy through the perineal urethral incision or a suprapubic cystotomy was proposed by the writer by means of a galvanocautery prostatectome devised by him for the purpose, as a desirable method of dealing with some cases of middle lobe enlargement. (This idea has been reproduced several times since, and various forms of instruments have been devised for the purpose. See historical summary.)

Since that time the writer has been accumulating personal experience and studying that of others, and it now appears to him that we have reached a point at which we can profitably "take account of stock," so to speak, and this is one of the principal motives for the publication of this communication.

The Second or Active Period.

What has happened since 1890? Briefly stated, this. The establishment of the operative treatment and disappearance of the opposition to it which existed then. That is to say, time and experience have amply justified the views of its former advocates.

To what has this been due? To the lowering of the mortality that was formerly associated with the radical operations by from one-half to two-thirds of its former percentage, and to the better character of results. What has this been owing to? Chiefly to improved technique, especially in connection with the perineal operations, and in a less degree to a better selection of cases for the application of the operations, and knowledge of the circumstances which are suitable to their performance.

The more important steps and changes observed in the progress of the operative treatment have been as follows:

The introduction of the indirect operations of castration and vasectomy; their rapid rise into favor and their recent decline. The high mortality which attaches to the former, in which there has been no diminution, is the chief reason for its present loss of popularity. With vasectomy, it is the uncertainty and relatively small number of good results that have done the same for it.

A most important change has been in the substitution, as a routine practice, of the total removals of the gland for the partial removals that were at first generally done.

The combined operation grew greatly in favor about halfway in this period, but has lost ground very much because of improvements in the performance of the perineal operation, which have made it unnecessary.

In 1897, the Bottini operation, which had lagged behind the rest, came to the fore again, owing to the repeated and able advocacy of Freudenberg and to some modifications in the instrument and technique. It gained a foothold in France and America, but has been in the hands of a comparatively small number of operators. At the present moment its popularity has begun to grow less in France, and in some degree, also, in America. In England it has been but little employed.

The most noticeable feature within the last four years is the remarkable manner in which the perineal operations have gained ground; especially here and in France, where it appears to be regarded as a new experience by a number of surgeons. In England the suprapubic operation has taken a fresh start because of the discussions provoked by Mr. Freyer.

Having outlined the steps taken in the development of the operative treatment, we can now pass to the consideration of the

CHOICE OF OPERATION.

No one method has established an exclusive monopoly in the field of operations for the relief of prostatic hypertrophy. There have been a number eliminated from it or are on the way to it, and at the end of twenty years' experience we are left with those with which we began, and may regard the choice as being limited to the following:

1. The palliative operations of perineal and suprapubic drainage.
2. The Bottini.
3. The total removal of the hypertrophied lobes by the perineal operations.
4. The same by the suprapubic and the combined operation.*

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* The high mortality attending the performance of castration, together with the inability to foretell which cases are likely to yield favorable results, and, finally, the uncertainty and relatively small proportion of cures attending this operation, have caused the loss of popularity which for a time it enjoyed after its introduction. That absolute and permanent cures have resulted from it no one doubts. We have all seen them, and the improvement in the condition of the patients in some cases was so sudden and so remarkable as to be scarcely credible to those who performed the operations. It was on this account eagerly welcomed, for no one suspected that so simple an operation would be found to be attended by the late mortality which Cabot and subsequently others showed it to have. I have not included it in the consideration of the choice of operations for the above reasons. Vasectomy has had some very strong supporters, among them Reginald Harrison, than whom it is difficult to find a safer guide as a rule. In this instance I am constrained to make an

Palliative Operations.—These are used as, 1. Operations of necessity; 2. As preparatory steps to more radical measures; 3. To relieve suffering; 4. In the hope of restoring voluntary urination by long-continued pressure and distention of the prostatic urethra.

(1) In the presence of any of the following conditions, one or another of these operations is necessitated, and is the only means open to us wherewith to afford relief.

A patient who is obviously too much prostrated to support any operation other than one of the slightest kind, and at the same time has one or another of the following conditions: Retention when no instrument can be passed into the bladder; intravesical hæmorrhage which cannot be controlled by ordinary means; ropy purulent urine that will not run through a catheter; ulcerated surface or condition of any sort that makes catheterization too painful to be used; necessity of catheterization so often that patient becomes exhausted from lack of sleep and rest; delirium, during which the patient frequently removes catheter secured in the bladder through the urethra in the ordinary way, or opposes use of the instrument, so that it cannot be passed. Under such circumstances something *must* be done, and the only course open to us is to secure the best drainage possible by the least amount of surgical interference, that is to say, by opening the perineal urethra or doing a suprapubic cystotomy under local anæsthesia when possible.

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exception, being unable to follow him with regard to his favorable view of this operation.

So far as we can learn, its performance is attended with quite as high a mortality as that of the Bottini or the perineal radical operations, and it cannot be claimed to secure so large a percentage of *cures* as the latter, at any rate. Again, it is not possible to assert in which variety or stage of the disease its benefits, when they do occur, will result from its performance. All things considered, therefore, we believe that surgical opinion in this country, which from the first has never favored this method of treatment, has been correct. I have included these two procedures in the analyses of the mortality, as I have also done the partial prostatectomies and a number of cases treated by the catheter in order to show upon what ground some of the statements I have made with regard to these operations rest.

We should never be deceived into thinking that *suprapubic puncture with a large trocar, and passing through it and securing* in proper position a soft drainage tube, is less dangerous to the patient than making an open incision under these or any circumstances, the writer long ago showed that the reverse was the fact; this is largely owing to the subsequent leakage of urine around the tube so introduced, and septic infection due to it in the prevesical space.

(2) Drainage has for a long time been used by some surgeons as a preparatory step to operations of a more radical character. Under its employment, in the fortunate cases, the renal functional capacity will improve, cystitis may be improved or cured, and the general condition of the patient be benefited, owing to the relief from pain and disturbed sleep which may have been present, etc., so that he may perhaps sustain a radical procedure.

(3) Very often relief to suffering at any rate will be secured, and the object sought, if that is what it has been, will have been accomplished.

(4) The idea of restoring voluntary urination, which has been lost, by means of the expansion of the deep urethra or pressure atrophy of the gland, through the long continued wearing of a catheter, or by letting instruments rest in the deep urethra for a time at intervals, is a very old one in connection with these cases. It is revived from time to time as a new procedure, tried for a while, and relapses into disuse again. That it may temporarily accomplish this object is undoubtedly true. The writer has had it occur in some of his own cases; but that the temporary relief will be maintained is true in so few, if any, cases, that it is not worth seriously considering as a remedial possibility.

How valuable long-continued drainage may be, Sir Henry Thompson and many others have demonstrated long ago. In one of Sir Henry's cases the patient remained in perfect comfort with continuous suprapubic drainage for something like fourteen years, and continued an active life during this time. In four of the writer's own cases the same was true, though for shorter periods, all the patients having been older when the operations were done, and their deaths coming sooner afterwards than in Sir Henry's case,—the longest interval being four years in one instance.

Reginald Harrison some years ago drew attention to the benefit that might be derived from the prolonged drainage of the bladder, with respect to the renal function, when the latter was deficient, and the writer has had a number of cases in which its value in this respect was marked.

Unless the condition of the kidneys and of the patient generally has been very greatly benefited by the palliative operations, the surgeon will be wise, if he has been able to secure comfort for him, to rest content with what the palliative method has accomplished, and not attempt further and more radical measures.

The high mortality associated with the performance of the palliative operations is not to be regarded as referable to the operations *per se*. As we have seen, they are, as a rule, used as a last resort; and when we are obliged to do something because of our inability to employ the ordinary catheter treatment or drainage through the urethra, and when this is the case, we are dealing with the most advanced forms of the disease as a rule, with patients with serious renal lesions and renal insufficiency, who are many of them already near death, and whose death is inevitable, no matter what form of treatment is used.

Combined Operation.

With regard to this method it may be said that until a few years ago it had the advantage of affording a greater control of the gland for the manipulations necessary for its removal; but this advantage was gained only at the expense of making the suprapubic incision in connection with that in the perineum. In other words, by adding very definitely to the dangers of the operation. This has in the greater number of cases been made unnecessary by the recent adoption of modifications by which the gland is rendered more accessible, and placed under better control in performing the perineal operations alone.

This being the case, we may for practical purposes eliminate the combined operation, and are consequently left with the three standard methods, with which we began the modern history of the operative treatment, to choose from, viz., the Bottini, the perineal total removals, the same by the suprapubic operation.

The Factors determining the Choice between the Bottini, the Perineal, and the Suprapubic, Complete Operations.

The *primary* factors determining the choice of one or another of several surgical operations all having the same object in view are:

1. Their relative dangers.
2. Their relative limitations.
3. The character of their respective results.

Dangers, General and Special.—Operative dangers are of two kinds: 1. Those to which the patient is exposed in a general way in the performance of one or another kind of operation, and of these we learn something by the study of their respective mortalities as such. 2. Those which are in greater or less degree peculiar to each method of operation, and these we learn by a study of the causes of death in the fatal cases attending the performance of each kind of operation.*

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* To determine these and other factors of this problem, I have collected, carefully studied, and analyzed 2627 cases in which various sorts of operations have been done. This series is, so far as I am aware, a much larger number than that hitherto presented by any one, and while, of course, it is entirely inadequate as a basis for final conclusions to rest upon, it yet has some value in that it may be taken as a fair representation of the sum total of experience up to the present time with respect to some of the elements entering into the operative treatment of the condition we are discussing.

In compiling and analyzing these data with reference to the operative mortality, two months after the operations have been taken as the time within which death can be called operative, and only such fatal cases as those in which death occurred within this period have been included; on the other hand, even within this time, all deaths which were clearly due to other causes than the operations have been excluded. Finally, all doubtful cases have been included. The statistics have been taken from the reported cases of 100 different operators of various nationalities, and

Method of Treatment.	Cases.	Deaths.	Mortality.
By catheterization:			
Rovsing	126	10	
Casper	51	3	
Watson	30	3	
	207	16	7.7 per cent.
Palliative operations—drainage	146	49	33.0 per cent.
Partial prostatectomies	160	22	12.5 per cent.
Total removals—perineal	530	33	6.2 per cent.
Total removals—suprapubic	243	28	11.3 per cent.
Bottini	1086	69	6.3 per cent.
Castration	210	34	16.2 per cent.
Vasectomy	252	21	8.3 per cent.
	2627	256	

The mortality of the perineal and the Bottini operations is practically the same, and both are decidedly lower than that of any other method; so far, therefore, as this factor is concerned, the choice would fall to the former two, and they would stand upon equal terms.

Dangers more or less Special to Each Operation, as shown by Analysis of Causes of Death.

The four factors—uræmia, sepsis, shock, and pulmonary complications—account for all but a very small number of deaths, and are therefore the only ones included in this analysis.

Bottini	27.0 per cent.	Uræmia (or Renal Insufficiency).
Perineal operations	35.0 per cent.	
Suprapubic operations	34.0 per cent.	
Bottini	52.0 per cent.	Sepsis.
Perineal operations	17.8 per cent.	
Suprapubic operations	8.6 per cent.	

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only such operations as were done since 1890 are included. A list of the authors whose writings supply the data for this communication is appended at the end of it.

Two hundred and seven cases treated by catheterization in the ordinary way have been added for the sake of comparing the results of operative with catheter treatment, so far as may be possible. Only those cases have been included in this 207 in which death followed the beginning of the use of the catheter within the period of two months, that is to say, within the time in which deaths may be regarded as directly due to operation in the operative cases. This is in order to put the catheter cases upon the same plane, for comparison, as the operated cases.

Bottini	5.0 per cent.	Shock.
Perineal operations	21.4 per cent.	
Suprapubic operations	30.0 per cent.	
Bottini	8.0 per cent.	Postoperative Pulmonary Complications.
Perineal operations	17.8 per cent.	
Suprapubic operations	22.0 per cent.	

Uræmia, or renal insufficiency, is, as we know, the danger which is the most serious of all in connection with these prostatic operations; but there is not enough difference in the degree in which it affects the mortality of one as compared with another of these three methods to give it value in the choice between them; it is an aid rather to determining whether any or no operations shall be done, and in this respect is of great importance.

So far as is shown by the above analysis of the causes of death, the largest share of danger from sepsis belongs to the Bottini operation. While it has a minimal proportion from shock and postoperative pulmonary complications, the contrary is the case with the two other methods. The suprapubic carries with it the greatest risk from shock and pulmonary complications.

There were only ninety out of the total number of 130 deaths occurring in connection with these operations in which the causes of death are specifically stated. That number therefore forms the basis of the above computation.

It is not without interest to note with regard to their mortality, a few of the best series of consecutive cases reported by individual operators, for the sake of having the opportunity to judge of each of the methods at its best. The following are given with this intention:

The Bottini Operation.

	Cases.	Death.	Mortality.
Horwitz	33	0	
Freudenberg	25	0	
Young	41	3	
Bangs	34	3	
	133	6	4.5 per cent.

Perineal Total Removal.

	Cases.	Death.	Mortality.
Goodfellow	74	2	
Albarran	59	2	
Proust	30	0	
Pauchet	20	1	
Rafin	20	1	
	203	6	2.9 per cent.

Suprapubic.

	Cases.	Death.	Mortality.
Freyer	45	5	
Moynihan	12	1	
Mayo Robson	12	0	
	69	6	8.6 per cent.

These figures may be taken as the best showing that can fairly be made for the three operations respectively. In these special series the greatest relative divergence from the average mortality given in connection with the total number of cases is shown in that of the percentage of the perineal operations, in which there is a difference of 3.2 per cent. better than the average. In the suprapubic there is 2.9 per cent. betterment, and in the Bottini, 1.8 per cent.

CASES TREATED OPERATIVELY BY THE WRITER BETWEEN 1886 AND 1904.

By Suprapubic or Perineal.	Cases.	Deaths.	Causes of Death.
Drainage	14	2	Both from uræmia.
Perineal prostatotomy	4	0	
Partial prostatectomy.			
Perineal	2		
Suprapubic	3	1	Uræmia.
Total removals.			
Perineal	14	2	1, pulmonary embolism; 1, pneumonia.
Suprapubic	8	2	1, shock and hæmorrhage (not properly operative); 1, uræmia.
Combined operations	12	2	1, pulmonary embolism; 1, shock and hæmorrhage. (Second case not properly an operative death.)
Bottini's cauterization	4	0	
Bottini's incision	1	0	
Castration	6	1	Acute delirium.
	68	10	

In neither of the two fatal cases treated by drainage can the result be properly attributed to the operation. In both the patients were in desperate and hopeless conditions when first seen by me. In one the patient, almost moribund, had complete retention, and no instrument could be passed into the bladder.

The second patient was in an almost equally desperate state, and it was impossible to catheterize him in the ordinary manner. Both deaths occurred from progressive uræmia, already far advanced, and a few hours after the trivial drainage operation had been done under local anæsthesia.

Two other deaths, one following total removal by the suprapubic, and one the same by the combined operation, should not be reckoned as due to operation. In neither case was the removal of the gland contemplated when the operations were begun. In both it became necessary in order to arrest serious hæmorrhage which had been produced by a number of false passages, in one case supplemented by numerous perforations of the bladder, prostate, and the peritoneum by a large trocar; and in the other case the false passages being made from the urethra by metal catheter in attempting to enter the bladder before I saw either of the patients. Both these patients died as the result of what had been done before the operations, and not in consequence of them.

With these four cases counted out, the mortality percentage of the whole series falls to 8.8 per cent., and makes the mortality attending the total removals by the three methods, which were thirty-four cases, 11.7 per cent.*

Causes of Death.—Including all the fatal cases in the writer's series, the causes of death are as follows: Uræmia, 4; shock and hæmorrhage, 2; pulmonary embolism, 2; pneumonia, 1; acute delirium, 1; total, 10.

Immediate results in fifty-eight cases surviving.

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* Since preparing this paper, two more total removals by perineal operation have been done, both patients recovering with good immediate results. The total number of complete operations is then thirty-six, with mortality of 11.1 per cent.

Regarding the immediate results as being represented by the patient's condition at the time of discharge at completion of convalescence, and classing them under the headings, Wholly relieved, Improved, and Failed, the following results are shown for the writer's series:

Wholly relieved, twenty-nine patients. The operations done for these patients were as follows:

Partial operations	0
Perineal prostatotomy	1
Bottini's operation	1
Castration	3
	5

Total removals of the hypertrophied gland in which immediate result was complete relief were twenty-four in number. The operations done were as follows:

Perineal prostatectomy	10
Suprapubic prostatectomy	5
Combined operation	9
	24

Improved.—Seventeen cases were improved as the immediate result of the operation. The operations were as follows:

Suprapubic drainage	4
Perineal drainage	4
Perineal prostatotomy	4
Partial suprapubic prostatectomy	2
Total perineal prostatectomy	2
Combined total removal	1
	17

Of the total number of fifty-eight cases, 79.3 per cent. may be classed as "good results."

Failures.

Castration	2
Perineal drainage	6
Perineal prostatotomy	2
Unchanged	2
	12

Late results of the author's operations. For judging of the late results, there are twenty-four, out of the total fifty-eight patients who survived operation, available. The late results in these were observed for periods from six months to six years subsequent to operation, and are as follows:

Cured, eleven cases.

Times observed.	Cases.	Operations.
6 months.	1	Perineal partial prostatectomy.
1 year.	1	Castration.
2 years.	1	Combined operation, total removal.
3 years.	1	Perineal total removal.
3½ years.	1	Perineal total removal.
4 years.	1	Perineal total removal.
4 years.	1	Combined operation, total removal.
4 years.	1	Perineal drainage.
5 years.	1	Combined operation, total removal.
6 years.	1	Suprapubic total removal.
1 year.	1	Suprapubic total removal.
	11	

Greatly improved, ten cases.

Times observed.	Cases.	Operations.
6 months.	1	Partial perineal prostatectomy.
8 months.	1	Perineal prostatotomy.
1 year.	1	Perineal prostatotomy.
1 year.	1	Perineal drainage.
1 year.	1	Combined operation, total removal.
1½ years.	1	Perineal total removal.
1½ years.	1	Suprapubic total removal.
2 years.	1	Perineal drainage.
3 years.	1	Suprapubic total removal.
4 years.	1	Suprapubic partial prostatectomy.
	10	

Failures, three cases.

Times observed.	Cases.	Operations.
6 months.	1	Total perineal removal. Urethrorectal fistula and general condition not improved.
6 months.	1	Castration.
1½ years.	1	Perineal prostatotomy.
	3	

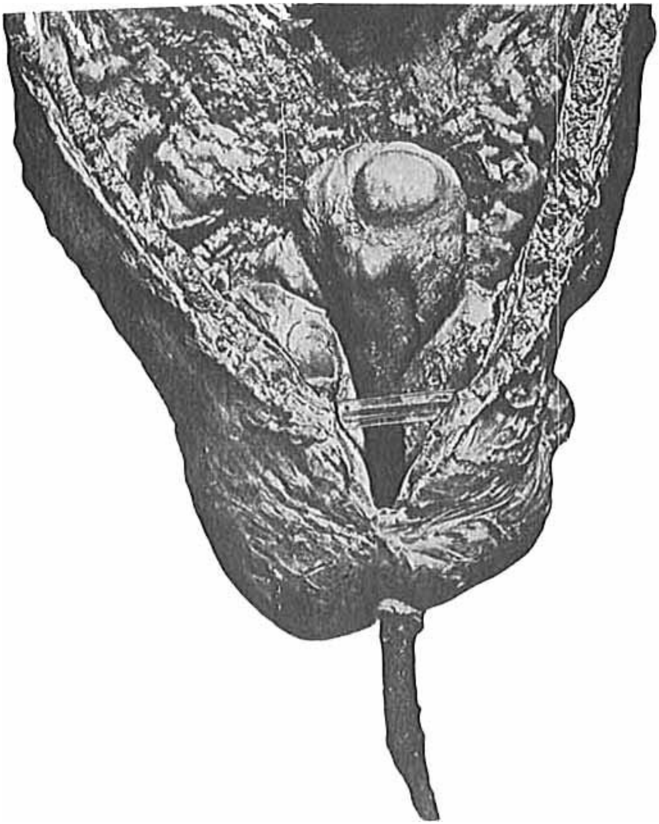


FIG. 1.—Extensive enlargement of both lateral and the median lobes. A case illustrating a form of hypertrophy especially inappropriate for the Bottini and perineal operations, and most suitable for the combined or suprapubic. Bladder and prostatic urethra laid open in front. (From Watson's Monograph, 1888.)

Of the cases which the writer was enabled to follow as above stated, all but three were "good results."

LIMITATIONS.

Bottini's Operation.—1. Inability to obtain a good view of the bladder by the cystoscope previous to operation, which is essential to its safe and proper performance.

2. Liability of perforating the bladder-wall in cases in which there is a bladder of small capacity.

3. Inability to apply the blade to the obstructing parts of the prostate, such as may occur in cases in which there is a very large high reaching third lobe; especially if it be in connection with extensive bilateral hypertrophy, such as is shown in Fig. 1.

4. Obstruction of the deep urethra such that no instrument can be passed.

Perineal Operations.—Such forms of hypertrophy as cannot be reached and successfully removed from the perineum, such are those of the median lobe mentioned above (Fig. 1).

Suprapubic and Combined Operations.—None.

RESULTS.

The term cure is used in what follows in the sense in which it is applied by Freudenberg to the results of the Bottini operation, viz., "Only those patients should be reckoned cured who can empty the bladder spontaneously; or who have at most a residual urine of not more than fifty cubic centimetres; whose urine is normal, and who can pass it freely and painlessly." To this I would add that this condition should have been maintained for at least six months after operation.

It is customary with those reporting Bottini operations to include the patients cured together with those improved under one heading as "good results." For the sake of uniformity, and after giving the two kinds of results independently, I have adopted also this usage, and applied it to the other methods as well as to the Bottini in making the following analysis.

For the purpose of determining the late results of the three methods, there are but 688 cases. These analyzed under the conditions mentioned above are as follows:

	Cases.	Cures.	Percentage.
Bottini	490	149	30.4
Perineal total removals	145	87	60.0
Suprapubic total removals	53	35	66.0

If the "improved" cases be added, we have as "good results": 86.0 per cent., 88.8 per cent., and 90.0 per cent. for the same three operations respectively.

Complications; Failures; Accidents attending the Operations.—The following complications occurred in connection with the Bottini operation in a series of fifty-nine of his cases reported by Willy Meyer. Perineal abscess followed the operation in four cases; in two it was due to injury of the membranous urethra; in one case recto-urethral fistula; in six cases epididymitis—one of them ending in suppuration; in two cases orchitis—ending in suppuration in one, and gangrene of the testicle in the other. Altogether thirteen, or 22.0 per cent., of the whole number in which there were serious or annoying complications associated with the performance of the operation

In 13 per cent. of the Bottini cases the operations had to be repeated. Incontinence of urine resulted in 2.6 per cent. of the Bottini operations. The operation failed in 11.6 per cent. of the cases. Of the sixty-nine fatal cases of the Bottini operation, eight were due to perforation of the bladder by the incising blade.

In the Perineal Operations.—Twice the peritoneum was opened; one patient died, one recovered. Urethrorectal fistula occurred in 2.7 per cent. as result of operation. Incontinence of urine occurred in 3.5 per cent. as result of operation. Failures occurred in 7.4 per cent. of the operations.

Suprapubic Operations.—Suprapubic fistula occurred in 1.0 per cent. of the cases; infiltration of urine in the prevesical space in 1.6 per cent.; peritonitis in one case; rectum was injured in one case; failure of the operation in 6.7 per cent.

OPERATIVE TECHNIQUE OF THE PERINEAL, SUPRAPUBIC, AND BOTTINI OPERATIONS.

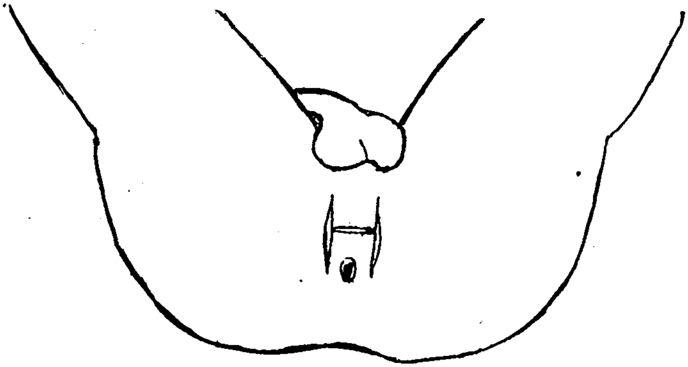
We have thus far been engaged in the study of the evolution of the operative treatment and its clinical features. There remains to be considered the detail of the operative technique of the three methods respectively. It is impossible to give a full description of the different modifications that have one by one been introduced in connection with each of these three operative procedures, without exceeding the proper limits of a magazine article. The reader is therefore referred for the fuller detail of some of them to the writings marked with * in the Bibliographical list at end of article. In the present communication the writer has selected from certain of the published descriptions only what is needed to make clear some of the more important steps as they have been illustrated in the numerous articles above referred to. Some of the latter are apparently not well known in this country, and are very instructive, and the most complete accounts given with respect to the detail of the perineal procedures that have appeared as yet. The last statement applies to the volumes of the annual reports of the communications presented at the meetings of the "Association Française d'Urologie," which represents the work of the most notable surgeons of France in this branch of surgery, and which has been published each year since the first assembly of the Association in 1896, by Octave Doin, 8 Place de l'Odeon, Paris.

Technique of the Perineal Operations.

The essentials for the successful performance of the perineal operations are: 1. The free exposure of the gland. 2. Making the gland accessible, and maintaining it in a fixed position while removing it. 3. Avoiding injury to the urinary sphincters. 4. Avoiding injury to the rectum. 5. Avoiding hæmorrhage. 6. Avoiding unnecessary injury to the urethra and ejaculatory ducts.

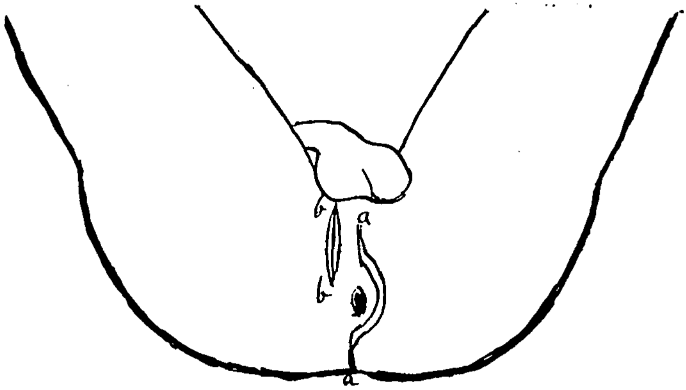
These we will consider in order.

DIAGRAM 1.



H, Incision suggested by Gerster.

DIAGRAM 2.



a, *a*, Dittel's lateral incision.
b, *b*, Nicoll's lateral incision used in connection with combined operation.

Diagram 3.

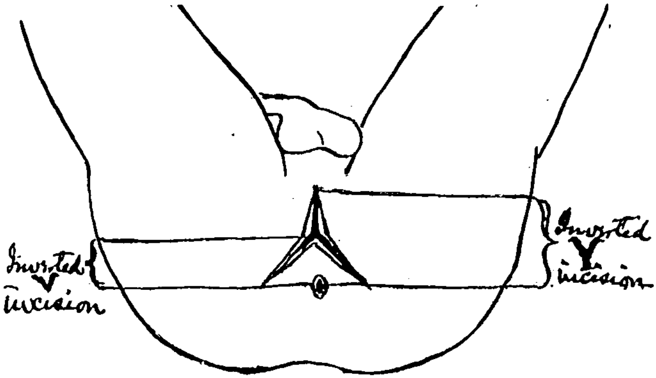
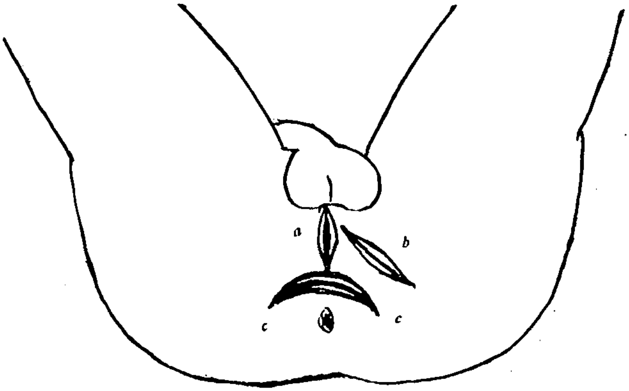


Diagram 4.



a, Median perineal incision.
b, Lateral lithotomy incision.
c, Celsus curved prerectal incision.

1. *The Incision.*

The accompanying diagrams show the various perineal incisions which have been applied, either alone or in connection with the suprapubic operation, for the purpose of removing the gland.

That one of these, which allows the freest approach to the gland and the widest avenue for its removal, is naturally the best one; and it is the transverse, curved incision extending from one ischial tuberosity to the other in front of the anterior margin of the anus, in short, the classic lithotomy incision which was introduced by Celsus nearly 2000 years ago, and subsequently slightly modified into the inverted V, and still further into the inverted Y incision, which was used by Fergusson, etc., in 1848 in lithotomy operations, and first applied to the removal of the prostate by Leisrink in 1882.

This incision, or one of the above modifications of it, will be selected according to the size of the gland and the greater or less amount of room required for its removal.

Reaching the Fibrous Sheath, and Exposing It.—The key-note to reaching and freely exposing the fibrous sheath through the transverse perineal incisions above referred to, is freeing the rectum from the posterior urethra and prostate. And the way to do it is by transverse division of the tendinous centre of the perineum, and blunt or finger-tip dissection between prostate and rectum until the outer covering of the former is fully exposed over its forward and posterior surfaces. (Fig. 2.)

The means employed for rendering the gland accessible are as follows:

For Removal through the Perineum.—1. Drawing the gland down by the tips of two fingers passed into the rectum as done by Celsus, in lithotomy operations, to which he gave the name of "cutting on the gripe."

2. Downward pressure from above the symphysis pubis, as taught by Sir Henry Thompson in 1882, in connection with digital exploration of the bladder.

3. The same manœuvre carried out through a suprapubic

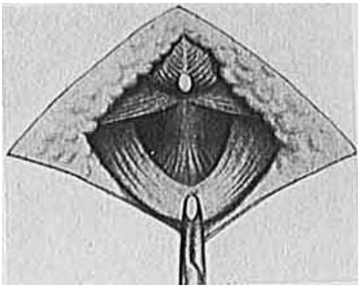
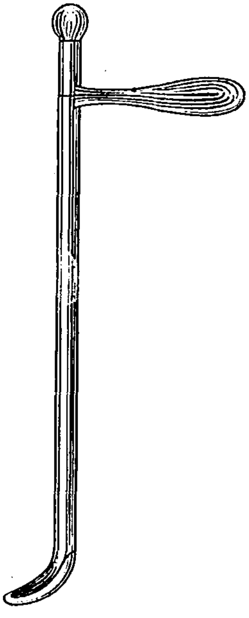


FIG. 2.—After division of central tendon. Exposure of recto-urethralis muscle. (Young.)

incision down to but not into the bladder, as suggested by Bryson and Guiteras. This procedure does not commend itself except with very fat subjects.

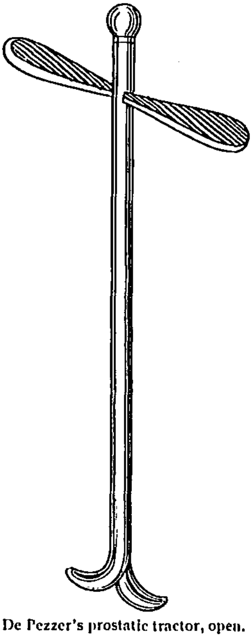
4. By various forms of tractors, the first of which is the two-bladed instrument introduced by Albarran, who, it is to be noted, abandoned it as being unsatisfactory; on the other hand, de Pezzer, who introduced a similar instrument somewhat later, speaks highly of the advantage to be gained by its use; so, too, does Young, of the instrument of the same character as the two just mentioned, which he introduced in the following year, having independently had the same conception of the form of an instrument that was suitable for the purpose that is embodied in Albarran's and the second of de Pezzer's instruments, the latter of which Young does not appear to have

FIG. 3.



De Pezzer's prostatic tractor, closed.

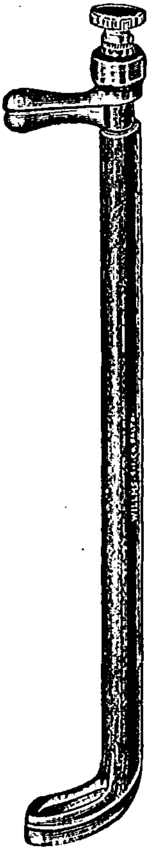
FIG. 4.



De Pezzer's prostatic tractor, open.

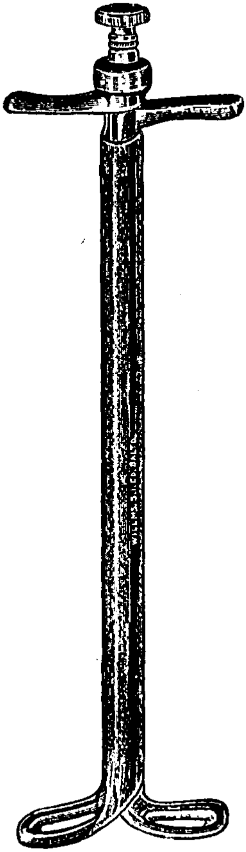
seen. (He refers to de Pezzer's combined incisor and tractor, but not to the larger two-bladed instrument which de Pezzer showed at the same time in 1902.)

FIG. 5.



Young's prostatic tractor, closed.

FIG. 6.

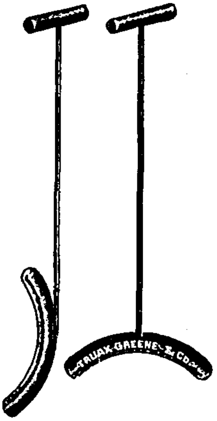


Young's prostatic tractor, open.

Other forms of tractors are the rubber inflatable balloon of Parker Syms, presented in 1902, and that of Lydston, and still another single-branched desenclaveur of Delbet. (Figs. 3, 4, 5, 6, 7, and 8 illustrate the instruments of de Pezzer, Young, and Lydston respectively.) These instruments are all used through a median perineal urethrotomy incision.

Of these different means, the writer has found downward suprapubic pressure, downward traction upon the further end of the gland by the tips of two fingers in the rectum, or by the tip of one finger passed through a median incision in the posterior urethra into the bladder and hooking it over the intravesical aspects of the lateral lobes, to be amply sufficient in all but fat subjects. These means have the disadvantage of being subject to the limitation just mentioned. They have the advantage that is derived from the use of a sensitive instrument, such as is the finger, as compared with all mechanical devices; on the other hand, the mechanical devices are less in the way of the operator than are the hands of the assistant, which may be required for the execution of the manual measures for depressing the gland and holding it in place.

FIG. 7.



Lydston prostatic tractor.

The criticism that the writer would make with regard to the tractors having metal arms is this: During the early part of the enucleation there is much aid to be derived from such instruments as those referred to above, but at the time that the greatest pressure is required, which is at the moment when one is separating the distal or intravesical parts of the gland from its coverings,—for they are the farthest away, and consequently the most difficult to reach and work upon; at that time, if a degree of traction is exerted sufficient to bring the gland down, there is some danger of having the metal branches of the instrument within the bladder tear through the latter and the prostatic urethra and the vesical outlet. This happened to the writer on the first occasion of his using Young's instrument. If it be applied in the cadaver, the danger will be seen to be one that is real; and it is well therefore to refer to it, not in disparagement of this, or of other instruments of the sort, but simply to caution those using them for the first time against this possibility of doing injury if care is not taken at the moment referred to above.

Removal of the Gland.—The following are the different ways by which the glandular tissue of the hypertrophies has been removed after the prostate is separated from the rectum and exposed:

1. By opening the prostatic urethra from its anterior end through about two-thirds of its length. The forefinger is passed into the urethra through this cut. The lateral aspect of the prostatic urethra is opened about midway in its length on one side sufficiently to admit the tip of the finger. This opening is made through the mucous membrane of the side of the urethra at the point just named, and must divide all the coverings of the gland—which are often nothing more than the mucous membrane here, though in other cases the outer sheath of the gland is well defined—down to its inner thin capsule or to the gland substance itself. The trained finger without the aid of sight can always readily recognize the surface of the gland. The opening through the side of the urethra may be made with the finger-nail, an ivory nail-cleaner, a gum-lancet, sharp-pointed tenotome, or a curved periosteum elevator, as the operator may prefer.

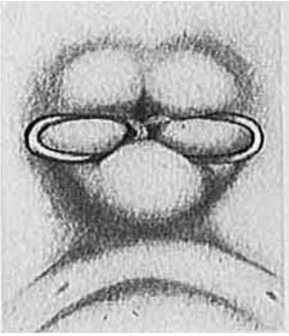


FIG. 8.—Showing position of blades in interior of bladder in case of median and bilateral hypertrophy. (Young.)

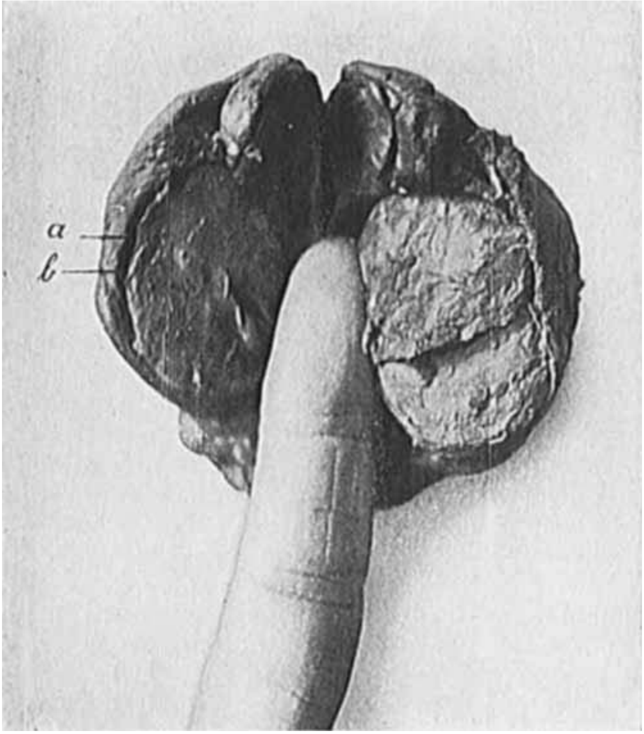


FIG. 9.—Illustrates the thickness of the outer sheath, *a*, in which the venous plexus lies; *b*, the space between the sheath and the inner capsule where the separation of one from the other takes place when enucleating. The gland has been exposed to view, as well as the prostatic urethra, by division of its superior aspect in the median line from above, and the middle lobe divided to its base in order to give a free view of the parts. The finger-tip is shown in the position taken by it when enucleation is begun from the lateral surface of the prostatic urethra through an external perineal urethrotomy incision. (Author.)

The tip of the finger is introduced through the opening thus made and the lobe on that side is enucleated, beginning by separating the glandular mass along its urethral side, then beneath, in front and over the outer lateral aspect, and, finally, from the bladder. The enucleation being always carried on inside the outer capsule or sheath. The thinnest parts of this sheath are found along the urethral side and the bladder side of the gland. It is often absent or very delicate in these places, the mucous membrane alone covering the glandular tissue there.

When the lobe on one side has been separated in this way, it is seized with forceps of appropriate form—the lithotomy forceps used for extracting the stone are convenient ones—and withdrawn through the opening in the urethra. Care should be taken not to attempt the removal of very large masses of the hypertrophied gland through this incision lest the membranous urethra be seriously damaged and incontinence result. In withdrawing the enucleated lobe there is another precaution which should be taken, namely, that of extracting it in an upward direction and of avoiding all downward pressure upon it, for it is in the latter way that the rectum is very likely to be torn through.

Fig. 9 shows the line through which the finger-tip is passed in reaching the gland from the side of the prostatic urethra, and also the space between the gland surface and its outer sheath in which the finger or instrument carries out the enucleation. This is the operation proposed by Gouley in 1879, and is the same with respect to the manner of conducting the enucleation of the gland as that part of the operation of Alexander in 1895, which he executed in connection with a suprapubic incision made for the purpose of depressing the gland, and in order to hold it steady during the enucleation.

2. Proust (1900–1901) varies the operation thus: Exposes the posterior surface of the gland; finds, isolates, ligates, and cuts across the upper ends of the ejaculatory ducts and the accompanying blood-vessels. In doing this he finds

the use of a tractor helpful. He does not describe its form, but illustrates the manner of its use (Fig. 10), which, it will be seen, is that in which the instruments subsequently devised by de Pezzer and Young are employed. After the division of the vessels, a part of the sheath of the gland is cut away from the posterior surface of the prostate; the latter, together with the prostatic urethra, is now split in two by a median incision through the posterior surface of the gland (Fig. 11). The two lateral lobes are then enucleated, each one entire. The finger is passed into the prostatic urethra and acts as a guide to prevent injury to the latter while the gland is being separated from it along the inner side of each of the lobes in turn. This is the first part of the enucleation, and is accomplished by scissors which cut the gland free where it impinges on the prostatic urethra; the rest of the prostate is separated from its outer sheath by finger-tip or scissors or blunt dissector as occasion demands, and each lobe as it is freed is withdrawn.*

Albarran's manner differs, in that he does not ligate the vessels or ducts, and, after splitting the prostate and prostatic urethra in two in the median line posteriorly, he introduces his forefinger, and begins the enucleation by separating the outer capsule or sheath of the gland from the latter along the line of the incision just mentioned, first with scissors, then with the finger as he proceeds towards the outer lateral aspects of the gland, first on one side and then on the other, until he has cleared about one-half or a little more of the gland from its outer sheath, working between it and the gland surface; then he frees the gland with scissors along its urethral side from the canal of the urethra until he has separated it for about half the length of the latter, at which point in the operation he cuts away the anterior part of the gland which he has freed from its attachments on all sides to that extent, dividing first one lobe across, including perhaps one-

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* Proust's manner of performing the operation, which is only outlined here, will be found in very full detail in the Mémoires de l'Association Française d'Urologie, 1901, Vol. v, p. 361.

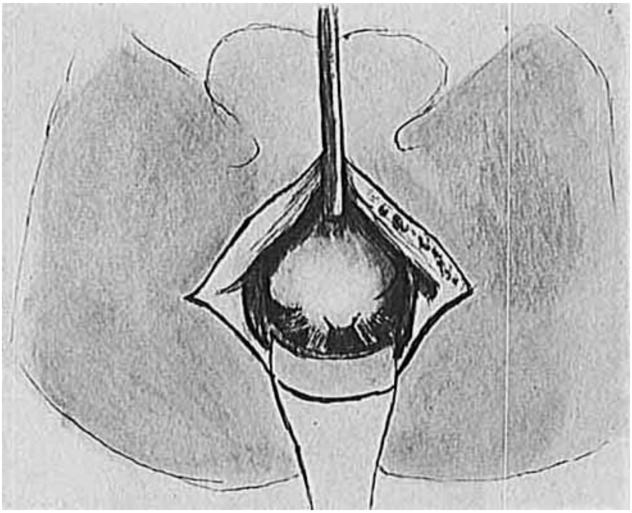

FIG. 10.—Showing posterior surface of prostate exposed and prostatic tractor introduced through the urethra just anterior to the apex of the prostate. (Proust.)

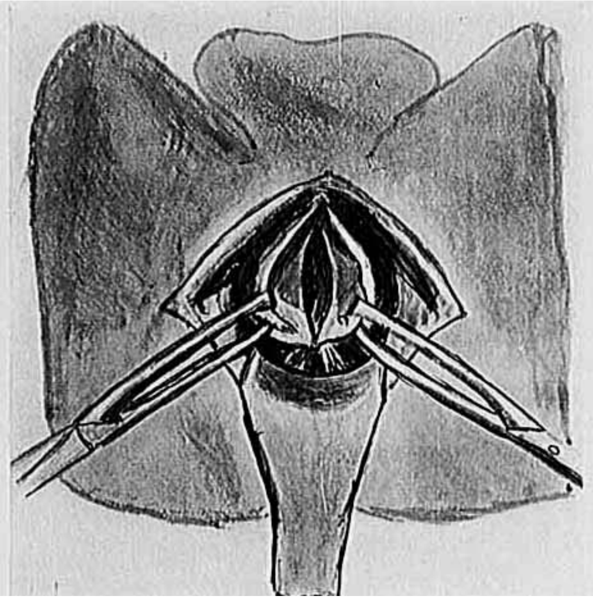

FIG. 11.—Showing the laying open of the capsule and prostatic urethra. (Proust.)

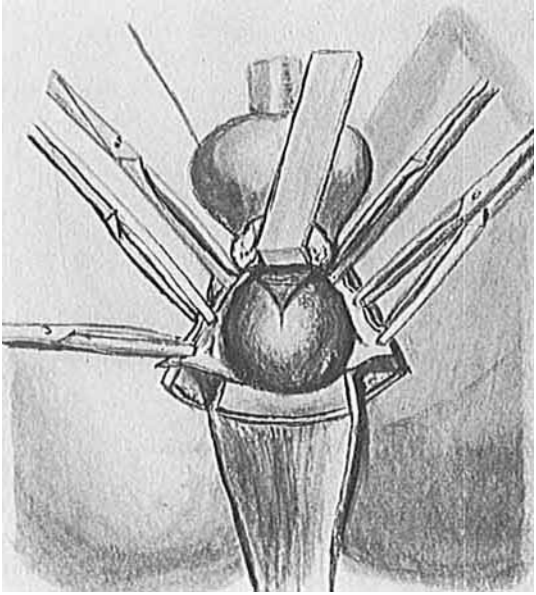

FIG. 12.—The prostatic capsule is separated and turned back from the front and the posterior aspects of the prostate, and its cut edges are held apart by forceps. (Albarran.)

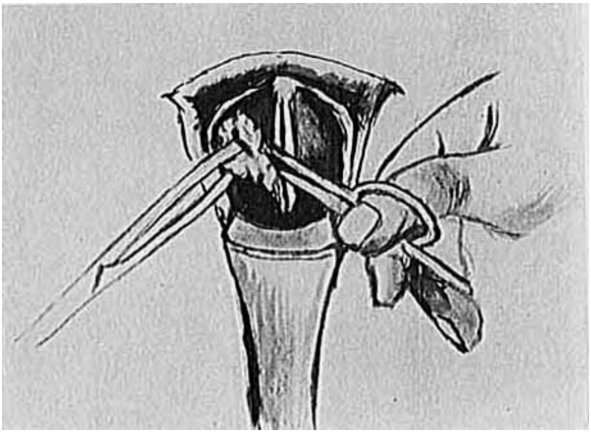

FIG. 13.—Extirpation of the anterior part of the prostate begun. (Albarran.)

half of it. This enables him to easily reach the farthest ends of the two lobes with his finger-tip pushed on into the bladder and to draw each of the remaining parts of the gland well down into the wound by the finger-tip employed as a tractor. He then goes on to complete the freeing of the rest of the gland from the sheath, and takes what is left of it away in one, two, or more separate pieces, as it seems most convenient to do. The middle lobe is removed by splitting the floor of the prostatic urethra and enucleating the upper portion of the lobe through this opening with the finger and by dividing the lower end with scissors. When the prostatic urethra is much enlarged and baggy, he makes a longitudinal resection of it, and sutures the cut edges together afterwards.

The manner in which the capsule is turned back from the forward part of the gland and the posterior surface of the latter is exposed preparatory to enucleation by *morcellement,* as just described as the manner employed by Albarran, is shown in Fig. 12.

The manner in which the prostate and prostatic urethra are divided and in which the removal of the anterior portion of the gland is begun by Albarran is illustrated in Fig. 13.

The details of the similar operations which are practised by Hartmann, Pousson, Loumeau, Reynes, Sigurta, etc., will be found handsomely illustrated and accurately described in the *Compte rendu de l'Association Française d'Urologie,* 1901 and 1902. That of Young, of Baltimore, which is similar in character, in 1903 is admirably described in the *Journal of the American Medical Association,* October 24, 1903.

The other steps that have been introduced, and by which the perineal operations were done at an earlier date than any of the above, are those of Zuckerkandl, 1889; Pyle, 1892; Nicoll, 1894; in 1895 Morris advocated the operation described by Pyle. The distinctive feature of Pyle's and Nicoll's manner of removing the gland lay in not opening the urethra at all. The enucleation in the former's way of carrying it out was to divide the capsule of the gland only in the middle line of the posterior surface of the prostate, and to enucleate each lobe in turn by the finger-tip or blunt dissector, and in endeavoring to spare the urethra while doing so. The enucleation was done within the outer sheath of the gland.

Nicoll's way was a combined operation, but the perineal part of it is the essential one, the suprapubic opening being incidental merely to the other for the purpose of depressing the gland and bringing it into the proper position for enucleation. The distinctive feature of Nicoll's operation consisted in the removal of the gland without injury to the urethra, or bladder through two lateral incisions made in the capsule near and outside of the median line. This latter feature of the technique he did not habitually employ, reserving it for cases which were unusually difficult, or in which there are very large lobes to be removed.

In the operation as done by Young, there is a definite attempt made to preserve the ejaculatory ducts. This Young says he is enabled to do. He reaches the gland through two incisions in the capsule, one on either side of the median line, somewhat similar to those employed by Nicoll, referred to above. He uses his two-bladed tractor in the same manner as that described by Proust already referred to.

Fig. 14 shows the manner in which Young employs the tractor, and also the capsular incisions on either side of the middle line. The enucleation he advises being done by a blunt dissector. Young employs another form of forceps for the purpose of aiding in bringing down the gland during the dissection and in its extraction. They are shown in Fig. 15.

Still another manner of effecting the removal is that of Rydygier. Rydygier endeavors to save the prostatic urethra by means of the following manœuvre: After exposing the gland and entering through its capsule by a median incision, he frees it from the outer sheath, except upon the parts of each lobe which lie adjacent to the prostatic urethra. Having arrived at this point, he clamps the part of the gland which is still adherent along the prostatic urethra—taking first one lobe and then the other—by placing one blade of a pair of

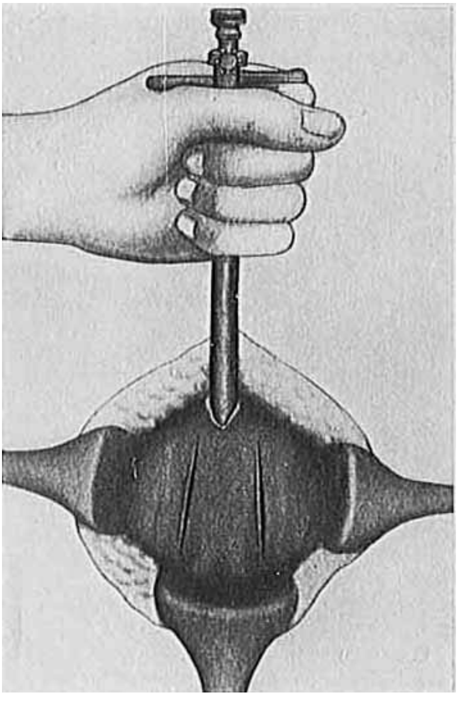

FIG. 14.—Tractor introduced; blades separated; traction made, exposing posterior surface of prostate. Incisions in capsule on each side of ejaculatory ducts. (Young.)

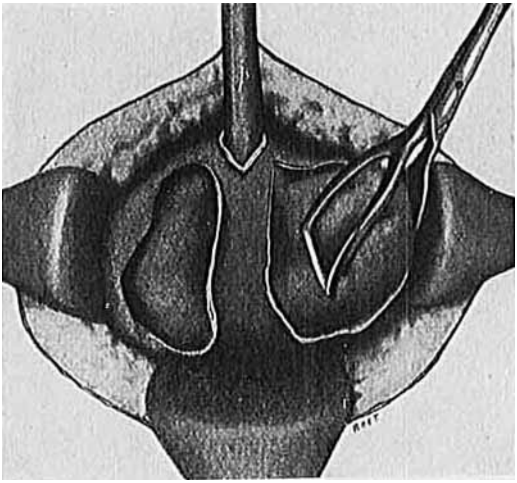

FIG. 15.—Enucleation of lobes. Forceps in position. (Young.)

forceps beneath and the other above the lobe in a direction parallel with that of the urethra, then closes the blades together and cuts off the parts of the gland lying outside of them with a pair of scissors. In doing this, there is, of course, a small part of the gland which remains adherent to the outer aspect of the urethra.

Still other steps are the closure of the empty pockets in which the enucleated lobes of the gland formerly lay. Also the suture of the incised urethra. Still another feature that is strongly insisted on by Proust and by Pousson is the assistance to be gained by raising the pelvis high in the air, in a somewhat exaggerated Trendelenburg position.

The distinctive qualities which have thus far appeared with respect to the removal of the masses in connection with the different perineal operations are: The injury or absence of it to the prostatic urethra and ejaculatory ducts; the difference between the operations in which the urethra is not opened at all and those in which it is.

The other features are of minor importance, except, perhaps, the matter of the capsular incisions. The choice in this respect being between those employed by Nicoll and Young and those in the middle line which are in more general use.

There is no doubt but that, of several technical methods, all of which seek to accomplish the same result, one which attains it with the least destruction of the parts involved is to be preferred, unless there is some very good reason to the contrary.

Regarded from this point of view, the methods introduced by Pyle, Zuckerkandl, and advocated by Morris, and the recent modifications introduced by the French surgeons, are those which accomplish the removal of the hypertrophied gland with the least injury to the parts. Just how far some of these structures can remain undamaged during the manipulations demanded for the removal of the gland is more or less open to question. On the one hand, Young tells us that he is able to effect the removal without injuring either the urethra or the ejaculatory ducts; on the other, Albarran and a good many other surgeons are less confident of their ability to do so. This sort of difference of opinion is one that is frequently met with in connection with many other surgical operations.

The next question which arises is how much harm is done to the patient by injury inflicted upon the prostatic urethra or, indeed, by its entire removal along with the gland. This point will be discussed later. The same question arises with reference to the saving of the ejaculatory ducts. With regard to this there is considerable difference of opinion; a good many operators regarding it as of slight importance, others laying much stress upon their preservation in all cases in which the sexual power still exists. There is no doubt but that the preservation of the ducts is of very great moment; in certain cases in which the operation is to be done for patients who are in the fifties, whose sexual powers are still active, and with whom there is, or is likely to be, a question of marriage, and by just so much more, of course, with any patient upon whose marriage and the begetting of offspring some important matters may depend. But under any other circumstances, and where the patient is not still in the vicinity of the time of full vigor of life, the ejaculatory ducts seem, to the writer, to be of very little consequence with relation to the performance of these operations.

The only objection that can be reasonably urged against the manner of operating which involves careful dissection, is that it demands more time than is needed when doing a quick enucleation through the sides of the prostatic urethra,—that is to say, Gouley's operation; and the importance of saving time is a question that will vary according to the circumstances.

That the enucleation of the gland can be done through a median perineal and prostatic urethral incision very rapidly, and without incurring risk of injury to the urinary sphincters or the rectum, the writer knows from personal experience. It is a more rapid procedure than the others which have been sketched. That it can be done without a larger death-rate than the latter involves, is attested by the results of the series of operations done by Goodfellow, which are the best yet reported.

The bilateral capsular incisions practised by Young seem to the writer to offer an excellent road of approach through which to undertake the enucleation.

The writer is strongly of the opinion that the enucleation should always be conducted in the space between the outer sheath and the capsula vera of the gland. He cannot think that it is important to cut away the sides of the pocket formed by the sheath after the removal of the gland, and cannot see how this can very well be done without incurring the liability to hæmorrhage from the venous plexus of the prostate. He is decidedly of the opinion that it is unnecessary to suture the urethra, and does not think that the slight difference in the length of time of healing as compared to that when the wound is not sutured is enough to be of importance. The attempt to close the pockets left vacant after the removal of the lobes is, it seems to the author, a mistaken one; a complete adaptation of their inner surfaces and obliteration of the cavity is only theoretically possible, and to attempt to do it prolongs the time of the operation, and invites pocketing within the small spaces necessarily made between the sutures. There are other reasons against this manœuvre which are presumably too obvious to make it necessary to enter upon them.

SPECIAL PRECAUTIONS, ETC.

Avoidance of Hæmorrhage.—This is done by carrying out the enucleation with the finger, or, at any rate, by avoiding the use of a sharp instrument, and by conducting the dissection or the enucleation between the inner capsule belonging to the gland itself, and its outer sheath (in Fig. 9 the finger-tip is placed in this plane), taking care not to wound the latter, since it is within it that the venous plexus lies. This is the manner which has for many years been practised in doing enucleations, and is in accordance with the anatomical teaching of Sir Henry Thompson and many anatomists, which has been recently emphasized by Mr. Freyer.

In most cases in which the gland enucleates readily, there is no difficulty in entering the finger into the proper layer wherein to carry out the separation of the gland from its sheath; but in some other cases there is difficulty in entering between the proper layers owing to the readiness with which the outer sheath splits up into a series of lamellæ. Fig. 16 illustrates this condition very well. The contrary condition is well shown in Fig. 17, in which specimen there is no such tendency displayed.

The varying thickness of the outer sheath in different cases, and in different parts of the same sheath, has a bearing upon the liability or the reverse of breaking through it into the prostatic urethra, either when enucleating or removing by *morcellement.* In some cases it is either absent or so thin as to afford no protection to the prostatic urethra, in which case it is impossible to avoid injury to the latter.

When the reverse is true, and there is a well-developed fibrous sheath, it is perfectly possible to avoid entering either urethra or the bladder when enucleating the lateral lobes, which are in such cases, at any rate, each enclosed within its own independent chamber, and which have no direct glandular continuity with the middle lobe when the latter is present. Enucleation without injury to the urethra is illustrated in both Fig. 16 and Fig. 17.

Avoidance of Injury to the Rectum and Prostatic and Membranous Urethra.—Injury to the rectum is most likely to occur from using a sharp instrument without sufficient care, that is to say, without having the finger of the other hand in the rectum, or else by trying to withdraw a large mass through a small opening, or, finally, by downward pressure upon an already enucleated lobe or lobes by the finger passed above them and in attempting to draw the mass out by it. The only accident of the sort that has happened to the writer was because of neglecting to observe this precaution.

The membranous urethra is most likely to be injured through too forcible manipulation with the finger when enucleating, or by the slipping of an instrument which is being employed in the dissection, or by attempting to withdraw too large a mass through the median external perineal urethrotomy

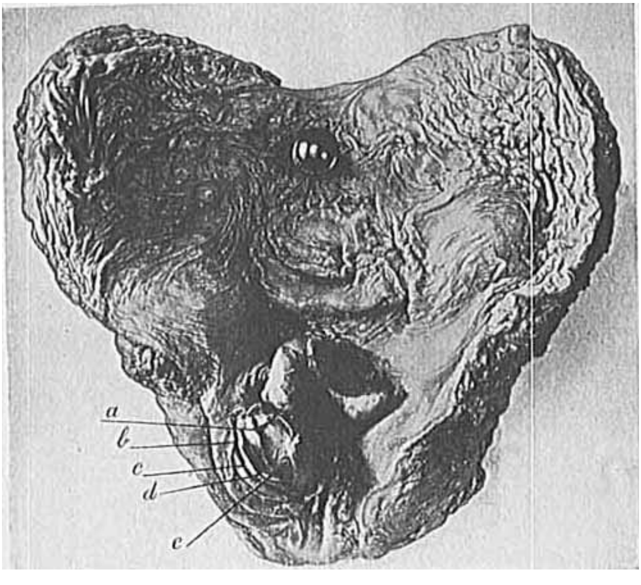

FIG. 16.—Specimen showing the manner in which the outer sheath sometimes subdivides into several distinct layers. *a*, a bit of the inner capsule lifted off the gland; *e*, the gland surface. *b*, *c*, *d*, represent three different layers of the outer sheath. (Author.)

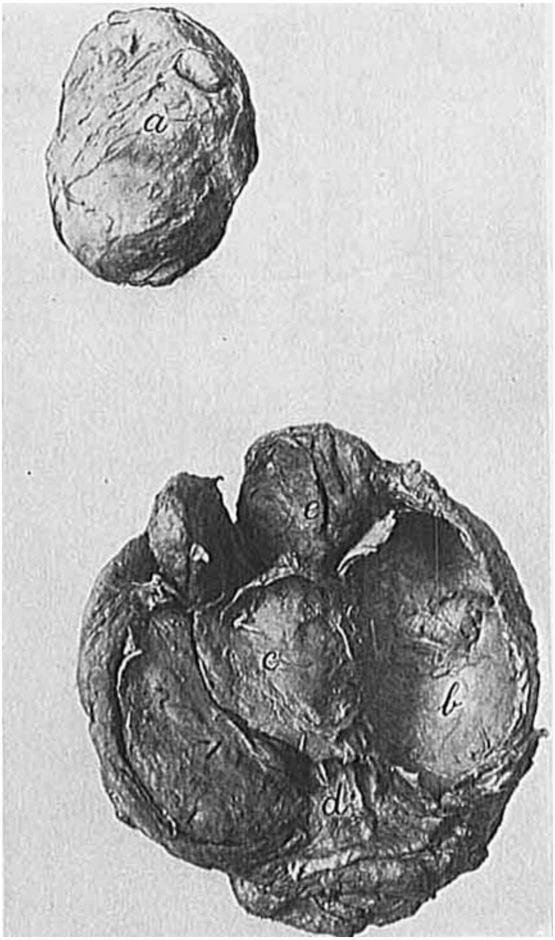

FIG. 17.—Prostate with left lobe, *a*, enucleated from its chamber, *b*. The upper surface of the latter, *c*, has been turned back across the prostatic urethra, *d*, in order to display the parts, and in so doing it has necessarily been torn; but it is seen that there is no continuity between the glandular structure of the left lobe that has been removed and that of the split middle lobe, *e*. It also shows that the lateral lobe may be removed in such a case without breaking into the urethra. (Author)

incision. The latter is one of the reasons for not using this incision.

Suprapubic Operation.—With regard to the suprapubic incision, there is but one modification which the writer has found occasionally to have any advantages other than those offered by the usual cystotomy incision. This consists in substituting for the median perpendicular cut a crescentic one extending through skin and subcutaneous fat, and turning up a flap from its lower margin immediately above the symphysis pubis. The bladder is then reached through the usual perpendicular incision between the recti muscles.

The best means for rendering the gland accessible is by lifting it upward with the fingers in the rectum and by pressure upon the perineal surface with the thumb at the same time. This is the manœuvre of Pierre Franco, which he introduced in 1560 in connection with lithotomy operations.

Bottini Operation.—The improvements in the Bottini operation are:

1. Not undertaking its performance unless a clear cystoscopic view has been obtained beforehand.

2. By the better knowledge of the currents by which the blade is heated, and by securing a known degree of heat by the use of a known strength of current.

3. By making the incisions more slowly.

4. By adapting their length, and by placing them according to the previously determined form, etc., of the hypertrophies in individual cases, instead of using, as Bottini did until his later operations, an incision of one size for all glands, making one cut in the median line above, and one in the median line below, in all cases, irrespective of the variation presented in them; providing the instrument with several blades of different sizes, as has been done by Young, and placing the incisions appropriately, as taught by Freudenberg, have been the two most important improvements which this operation has undergone.

In doing the Bottini operation the bladder should not be empty, as it is then much more exposed to the chance of being injured by the incision. Fig. 18 illustrates the injury or danger to which the bladder may be rendered liable by the subsequent sloughing after an incision which implicated some of the thickness of its wall.

An empty bladder also invites the accident of including in the incision the interureteral bar when the latter, as is so often the case, is enlarged and rests directly upon the upper surfaces of the hypertrophies.

DISADVANTAGES, OBJECTIONS, AND ADVANTAGES.

Bottini.

1. Insufficient drainage of the bladder, and liability to retention.
2. Secondary hæmorrhage.
3. Liability to epididymitis and orchitis.
4. Necessity of repeating the operation in a number of cases.
5. Relatively small number of *cures*.
6. The existence of the special limitations previously stated.
7. Inability to see the steps of the operation.

Perineal Operations.

1. Greater liability to pulmonary complications and to shock.
2. Liability to injure the rectum and the membranous urethra, and consequently to recto-urethral fistula and urinary incontinence.
3. The limitation to its performance previously stated.

Suprapubic Operation.

1. Liability to dangers of shock and pulmonary complications.
2. High mortality.

Combined Operation.

1. High mortality.
2. Liability to dangers of shock and pulmonary complications.
3. Unnecessary suprapubic opening.

ADVANTAGES OF THE ABOVE RESPECTIVELY.

Bottini.

1. Low mortality.
2. Minimum of danger from shock and pulmonary complications.
3. Absence of general anæsthesia.
4. Short period of confinement.

Perineal Operations.

1. Low mortality.
2. Completeness of result.
3. Open to visual dissection.

Suprapubic Operation.

1. The less liability to injure rectum and membranous urethra.
2. Ability to remove the enucleated masses through a wider channel.
3. Somewhat less liable to be limited in its application by anatomical conditions.

Combined Operation.

1. Greater control of the gland during steps necessary for its removal in fat subjects.
2. Choice of removing the separated masses by upper or lower route.
3. Freer drainage.

Many of the foregoing objections should not prevail, in our judgment with regard to them, since they are not necessarily involved in their performance, but are avoidable if skill and knowledge for the purpose are possessed by the operator. Thus the objection which is frequently brought against the Bottini operation—that it is performed in the dark—is not in the writer's mind a sound one.

The same may be urged against lithotrity, or any other operation that is done without the aid of sight and of immediate contact of the finger.

Like other operations of which this is true, it may properly be said that they should not be done by any one who has not special skill.

Of all the intravesical operations done under such circumstances, the Bottini seems to me personally to demand the greatest degree of trained tactile sense in order to carry out effectively and simply the instrumental manœuvres. But, as has been said, this fact *per se* does not properly constitute an objection to the operation, but merely to its indiscriminate use.

Other objectionable features may be eliminated by skill and technical knowledge. An example of this in the Bottini operation is with reference to the application and the extent of the incisions; another, avoiding doing the operation upon an empty bladder. The rest of the objections must be regarded as inherent to the performance of this operation.

Similarly, with regard to the perineal and suprapubic operations; thus avoidance of injury to the rectum and membranous urethra and of hæmorrhage are all matters of care and skill.

Matters Sub Judice.—1. Apart from its being *desirable* to avoid unnecessary injury, what harm, if any, is done by injury to or removal of the prostatic urethra? 2. Can the whole gland be removal in one mass and have the urethra left intact?

1. So far as the writer is aware, there is no positive proof that harm results either immediately or remotely from injury to the prostatic urethra or its removal in the course of these operations. Mr. Freyer has asserted that none occurs. The evidence which he adduces in support is not convincing in character, since it is drawn from the cases in which the operations must have been recently performed with reference to the time at which the statement was made, for he claims to have left the urethra intact in the earlier operations, and those to which he refers are his later ones.

This view receives support, however, from the experience that has been published with reference to what happens when the prostatic urethra has been removed in the course of resections of the bladder and prostate, as in the case reported by Fuller (*Journal of Cutaneous and Genito-Urinary Diseases*, New York, December, 1898) and from others of a like char-

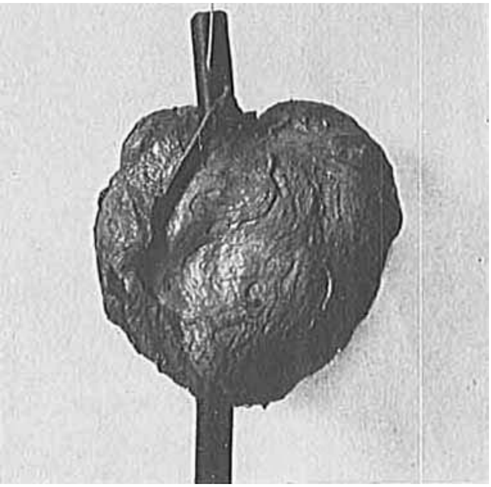

FIG. 19.—Total enucleation of the gland in one mass, together with the prostatic urethra —middle lobe not hypertrophied. "*Freyer's operation*" by author through suprapubic incision, December, 1897. Recovery. Permanent cure. (Author.)

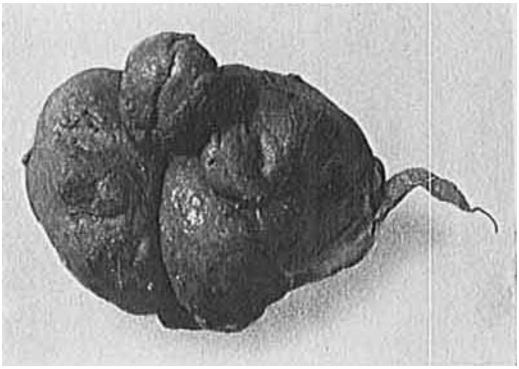

FIG. 20.—Total enucleation of gland—all three lobes hypertrophied—in one mass by suprapubic route, April 11, 1902. A bit of the capsular propria turned back from one lobe. Recovery. Cure. (Author.)

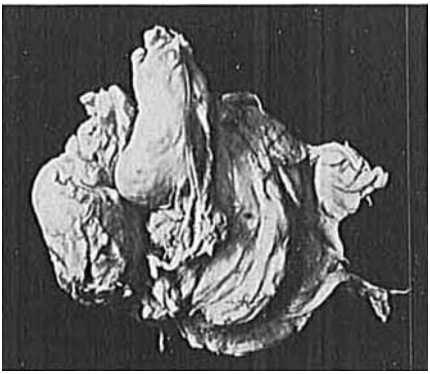

FIG. 21.—The three hypertrophied lobes removed, together with a large part of prostatic urethra, in one mass, through median perineal incision. A part of the capsular propria turned back from the margin of one lobe. (Author.)

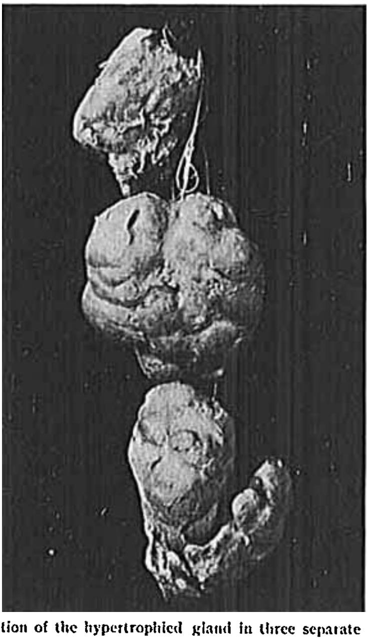

FIG. 22.—Total enucleation of the hypertrophied gland in three separate masses, each representing the lateral and middle lobes respectively, removed by the author by perineal median urethrotomy incision, October 22, 1903. Recovery. (Author.)

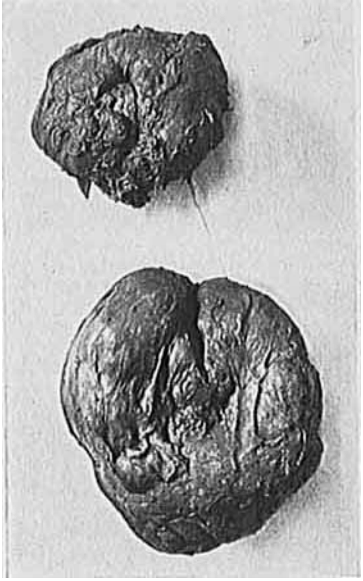

FIG. 23.—The entire prostate removed in two pieces—one consisting of the two lateral and the other of the median. Removed by suprapubic prostatectomy; by enucleation with the forefinger, counterpressure from the rectum. Operation by author, August, 1893. Death from pulmonary embolism on third day. (Author.)

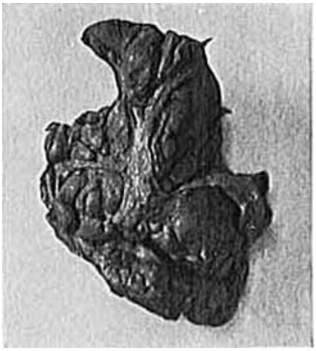

FIG. 24.—One lateral and median lobe removed together by enucleation—a case in which it was not proper to do it. Destruction of tissue unnecessarily great, and incontinence results. Recovery. (Author.)

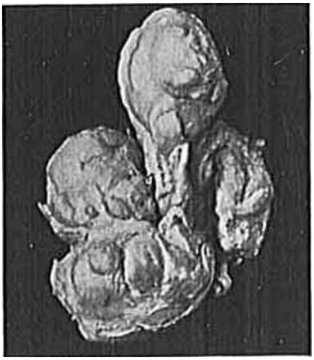

FIG. 25.—Specimen from case of author's.

acter, in which the newly formed channels remained patent and serviceable.

To these the author is able to add a few other observations from his own cases of total removals of the hypertrophied gland, together with the prostatic urethra, or in connection with which the prostatic urethra was injured, as follows:

1. Suprapubic extirpation in one mass together with the prostatic urethra, that is to say, after the manner of Mr. Freyer's "new operation." This operation was done in December, 1897. Fig. 19 is a photographic illustration of the specimen reduced in size. This patient was under observation from time to time for five years, during which no harm had resulted from the removal of the prostatic urethra.

2. A similar case. Operation similar. Performed in 1900. Under observation two years. No harm resulting from removal of prostatic urethra. Fig. 20 is from photograph of the specimen after removal.

3. Total removal in one mass with extensive injury to prostatic urethra. Operation through perineal incision. Under observation four years, no harm resulting from urethral injury. This specimen is shown by photographic illustration, Fig. 21.

4. A second case, in which the mass was removed in three pieces by enucleation through an external perineal urethrotomy incision, and by exposing the gland by tearing through the sides of the prostatic urethra with the finger-tip. The lobes are shown in Fig. 22.

5, 6, 7, 8. Four cases in which the gland was removed by the combined operation, enucleation being carried out in two through the same channel as that described in the last case, and the other two being enucleated through an opening made with the finger-nail through the intravesical coverings of the gland. Three of these cases are illustrated in Figs. 23, 24, and 25. The last five cases were observed during three, five, four, two, and one years respectively. No harmful result from urethral injury occurred in any of them during those periods.

This testimony, though small in quantity, is of positive character and of value in view of the small number of cases in which accurate reports have been made with reference to this point.

2. Can the whole gland be removed in one mass and leave the urethra behind intact?

The author has tried to do this on post-mortem specimens in a considerable number of instances, and cannot succeed even with the gland in full control on the table before him. Beyond this he will offer no opinion with regard to the matter.

With regard to the next point, however, his opinion is perfectly well defined. Assuming that Mr. Freyer's assertion with regard to leaving the urethra intact be correct, the question which naturally suggests itself is, wherein lies the particular advantage of removing the gland in one mass as compared with its total removal in two or more masses? Thus far nothing has been brought forward which furnishes a satisfactory answer to this question. It remains for him, or those who are advocating its removal in this way, to supply it.

There is one comment upon Mr. Freyer's views upon this subject which, inasmuch as we have entered upon a discussion of them, it is difficult to avoid making. It is with reference to some statements made by him at the end of a communication which appeared in the *Practitioner,* June, 1903, Vol. lxx, No. 6. Mr. Freyer says:

"Under the circumstances, I submit that the results of this (his new) operation are remarkable." . . . "I think I shall not be accused of exaggeration when I say that all previous so-called methods of radical cure for enlarged prostate are unsatisfactory." . . . "I submit that the successful results obtained in these cases of total extirpation of the prostate encourage us in the hope that we have *at last* arrived at a rational and practical method of treatment of this painful and fatal malady."

In view of the existence of a large number of reported cases and results published in the course of the past fifteen years by some of the best known and most skilful surgeons in the world, in which the results are both with respect to

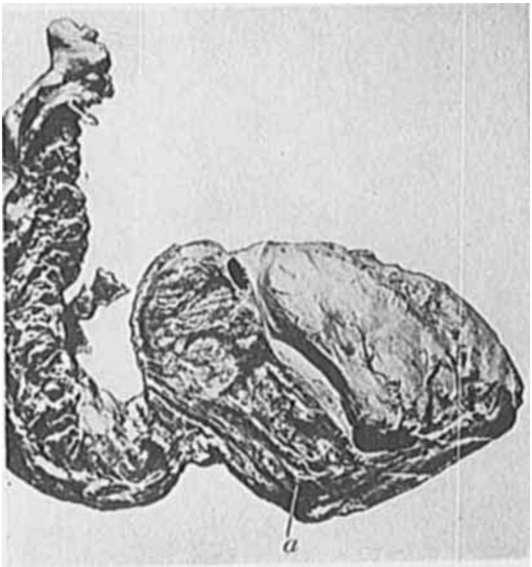

FIG. 26.—Specimen of the author's, showing the slightness of the tissue separating the under surface of the middle lobe and the retro-urethral space.

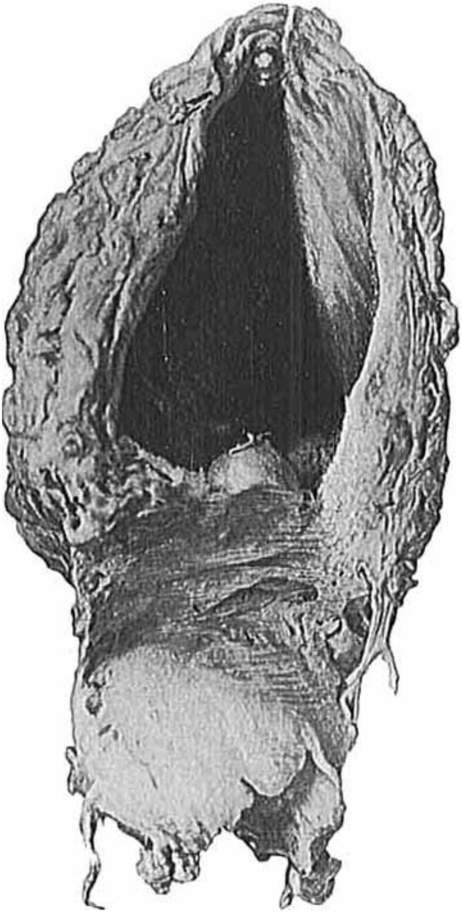

FIG. 27.—Specimen of the author's showing gland in which the attachments between the sheath and the surface of the gland are very intimate, and make the case one in which it is difficult or impossible to enucleate.

mortality, length of time observed, and completeness, better as well as larger in number than those presented by Mr. Freyer, it is not quite apparent upon what particular features of his own series of forty-five cases with its mortality of 11.1 per cent., which is a little greater than that of the average of similar operations, his assertions rest.

Some Points suggested to the Author in the Course of His Experience.—1. Fig. 26 (*a*) illustrates very well one point in connection with the removal of the middle lobe. It is the intimate connection, in some cases at any rate, between the posterior surface of the middle lobe's extension into the posterior urethra and the latter; also the very small amount of tissue which interposes between it and the rectovesical space outside the urethra, owing to which the latter is very liable to be torn through in the removal of the middle lobe, unless special care is taken.

2. The inadvisability of persisting in the attempt to remove lobes by enucleation which are so intimately connected with their outer envelope as to be inseparable by enucleation without incurring great liability to wounding the venous plexus in the outer sheath by tearing through it while making this mistaken endeavor. Fig. 27 illustrates very well a case of this kind, in which there is no clearly defined distinction between the gland's proper capsule and its outer sheath. In all cases such removal should be by *morcellement.*

3. That *only* the hypertrophied part of the gland should be removed in those forms of hypertrophy which are sometimes seen, in which one or the other part of the gland is normal, while the rest is involved. In cases in which one part of the gland remains normal and the rest is hypertrophied, only the latter should be removed.

Summary.—1. The experience of the last fifteen years has done away with the previous opposition to the operative treatment of this malady, and has demonstrated its right to a legitimate and recognized place among surgical therapeutic measures.

2. This has been due to the steady decline in the mor-

tality attending its employment and to the constantly better results obtained.

3. The number of clinical data are to-day sufficient to have *per se* a definite value and authority, though not such as to allow absolute final conclusions to be drawn from them alone.

4. The decline in mortality attending the operative treatment has been chiefly due to the improvements in the technique, notably in connection with the perineal radical operations, and, though in a much smaller degree, to the better selection of patients for the application of operative treatment.

5. The special danger in connection with the performance of all the operations is from uræmia.

6. Sepsis has played the most important part in the fatalities associated with the performance of the Bottini operation, the least in connection with that of the radical perineal and suprapubic operations.

7. Postoperative pulmonary complications and shock have been minimal dangers connected with the Bottini and maximal in the other two.

8. The high mortality attending the palliative drainage operations is due to the character of the cases upon which they have necessarily been performed, and not to the operations *per se.*

9. In a general way it may be said that the operative mortality has fallen to at least one-half of what it was fifteen years ago.

10. That the greatest gain in this respect is that shown by the perineal and suprapubic operations, the least by the Bottini.

11. That the operations of total removal of the gland under improved technique are attended by a smaller mortality than are the partial removals of obstructing parts.

12. That the better drainage secured by the former is one of the chief elements in determining this result.

13. No one has as yet produced individual series of cases which show such favorable results with *respect to mortality* in

connection with the performance of any *other form* of operative treatment, as have Goodfellow and Albarran by the *perineal complete operations.*

14. Of the distinctive methods which have been introduced into the operative field, the palliative operations for drainage,—the total removals by the perineum,—the same by the suprapubic routes, and the Bottini have survived the test of experience.

15. The most important advance made with respect to the perineal and suprapubic operations has been in the recognition of the fact that the more radical procedure of total removal was not more dangerous *per se* than the partial removal of obstructing portions, and in the substitution of the more radical measures.

16. The most important steps in advance with respect to the technique of the various operations have been the application of old manœuvres and the introduction of new means for making the gland more accessible, and for maintaining it in place during its removal, and the adoption and adaptation of appropriate incisions and methods of removing the hypertrophied masses, whereby this is accomplished in the most complete manner with the least injury to the structures involved in the performance of the operations.

17. Owing to the greater ease thus secured in effecting the purpose, it is often possible to preserve the urethra uninjured. *Often, not always, that is to say, if total removal is effected.* The same is true with respect to the ejaculatory ducts.

18. While injury to the prostatic urethra is not necessarily harmful, it remains to be shown what compensating advantage is secured *by any* manner of operating which involves injury to the prostatic urethra which should make us prefer to adopt it instead of an operation which seeks and offers the chance of preserving the parts with a minimum of or no injury at all.

19. It is not as yet shown wherein lies the advantage of removing the whole gland, suprapubically or any other way;

in *one mass* as compared with its *total removal* in two or more masses.

20. The improvements in the Bottini operation which are the most important are the adaptation of the size and location of the incision in conformity with the size and form of the hypertrophies in individual cases, and the introduction of the means by which this may be done, and the securing of more reliable heating of the blades of the instrument.

21. The results with respect to cure are far better in the perineal and suprapubic operations than in the Bottini.

22. There are fewer limitations associated with the performance of the suprapubic and the perineal operations than with the Bottini.

CONCLUSIONS.

The mistake which is such a constant factor in all affairs in which the judgment is involved, namely, that of excessive partisan advocacy of one or another manner of accomplishing a certain thing to the exclusion of other ways, has been unusually conspicuous in connection with the history of the development of the operative treatment of this malady. It is perhaps owing in part to the fact that it is a problem which will necessarily acquire a painfully personal significance to a proportion of those who are engaged in the attempt to solve it in the best way, and partly because surgeons, to whom it is a new subject, are at intervals entering the field and undertaking these operations, and having but little time to read or learn what has gone before become absorbed by their interest in one manner of operation, and do not obtain a proper perspective of the subject. It has been very interesting to those who have, so to speak, grown up with the operative treatment, to see how often, within a very short cycle, the same ideas have occurred to different men, and been introduced as new methods, unconscious of their having been in use before, and of having been, in most instances, discarded because not good, or having been superseded by something better. The fact that should be first of all kept clearly before the mind is this, which I will state, as I stated it sixteen years ago, for it is as apt now as it was then, "that, contrary to what would be inferred from the writings of various authors, we do not *in all cases* have a free choice of a number of operations, but are more or less compelled to the selection of one or another of them according to the conditions presented in individual cases." (Watson on the "Operative Treatment of the Hypertrophied Prostate," 1888.) What those conditions are has been shown in the course of the communication.

1. The most important single factor in determining whether or not radical operative treatment should or should not be applied is the capability or the reverse of the renal function. Other than this are the general strength or feebleness of the patient, his comfort or suffering, and the probability of the continuance of the one or the occurrence of the other if operative treatment is *not* applied.

2. Radical operative treatment has not as yet reached the status at which we are justified in saying that all cases of prostatic hypertrophy should be submitted to it as soon as the condition is clearly made out, and has begun to give rise to slight symptoms. But we are justified in saying that patients should be given the benefit of it at a much earlier stage of the malady than it has been customary to apply it, and that where it is applied by those skilled in its performance, as soon as the hypertrophy can be clearly detected by examination, and if at the same time it is already giving rise to well-marked symptoms, and the patient's condition is not unfavorable to the performance of an operation of this magnitude, the mortality of the operations, *were they applied at that time, will be a trifling one, and their risks not nearly so great as those entailed by the use of the catheter, assuming the latter to have been employed instead and under the same conditions.*

3. The operations should be undertaken under favorable circumstances as soon as the above conditions occur.

4. With regard to choice of operation, the following are the writer's conclusions:

Under conditions in which there is nothing to prevent a free choice of method,—

1. The total removal of the gland by the best of the perineal technique is that of choice.

2. When any condition is present which makes the perineal operation too difficult of performance, or is a contraindication of any sort to its application, the suprapubic operation is the operation of choice, and when contraindications are present which make this operation undesirable, the Bottini becomes the operation of choice, and when the patient's condition is such as to make any of the above three methods inappropriate, and we are obliged to do something, we will do a palliative operation for drainage.

Cystoscopic examination should, when it can be readily done, precede operations of all sorts in which there is any doubt as to the exact nature of the hypertrophies, and is essential to the proper performance of the Bottini. Its utility with regard to the other operations is that of learning whether or not there is present a middle lobe of such size and position as to make the perineal operation especially difficult of performance.

BIBLIOGRAPHY.

Adenot. Ann. des Mal. des Org. Gen.-Urin., September, 1902.

* Albarran and Hallé. Ann. des Mal. des Org. Gen.-Urin., February, 1900; Bull. de la Soc. de Chir., Paris, November 5, 1901; Ann. de Mal., Tome xxi, p. 1672. Compte rendu de l'Assoc. Française d'Urologie, 1901.

* Alexander, Samuel. 1895, New York Medical Record.

Andrews, E. W. Journal of the American Medical Association, October 18, 1902.

Atkinson. Quoted by Moullin.

Bangs, L. Bolton. New York Medical Record, March 9, 1901.

Belfield. Medical Record, March 10, 1888; American Journal of the Medical Sciences, November, 1890; Journal of the American Medical Association, September, 1886, and March, 1887.

Bierhoff, F. Journal of Cutaneous and Genito-Urinary Diseases, New York, 1900, xviii, p. 485.

Billroth. 1867.

Bottini. Arch. f. klin. Chir., xxi, p. 1, 1877; Berlin. klin. Woch., November, 1890; London Lancet, 1885, i, p. 582.

Bouffler. ANNALS OF SURGERY, 1902, p. 838.

Brown, Buckston. Lancet, November 23, 1901.

Bryson. St. Louis Medical Record, February 22, 1902; ANNALS OF SURGERY, November, 1902.

Cabot, A. T. 1893, David Clapp & Son, Boston; ANNALS OF SURGERY, September, 1896.

Casper. Berl. klin. Woch., 1888, p. 461; Centr. für Chir., No. 31, 1903, p. 850.

Cautermann. Société Belge d. Urologie, Séance de February 1, 1903.

Chetwood. New York Medical Journal, May 31, 1902.

Clarke, Bruce. British Medical Journal, October, 1889.

Collins, Sir W. J.

Crandon. ANNALS OF SURGERY, December, 1902.

Czerny. Centr. für Chir., June 13, 1903.

Deaver. Philadelphia Medical Journal, April 19, 1902.

Delageniere, H. Arch. Provinc. de Chir., June, 1902.

Delbet. Société Anat., July, 1902.

Desnos. Ann. des Mal. des Org. Gen.-Urin., December, 1895.

Dittel. Wiener klin. Woch., 1890, No. 18; Intern. klin. Runds., Wien, June 18, 1893.

Dorst. Ann. des Mal. des Org. Gen.-Urin., Tome xxi, 1903, p. 1666.

Durand. Ibid., 1903, p. 1801.

Ferguson. A Paper at Western Surgical and Gynæcological Association, December, 1901.

Fergusson, Sir Wm. London Lancet, January 1, 1870.

Freudenberg, A. Verhand. d. Deutsch. Gesell. f. Chir., 1897; Centr. f. Chir., 1897, No. 29; New York Medical Record, July, 1898; Berlin. klin. Woch., 1899, No. 23; Deutsche med. Zeit., 1900, Nos. 1-6; New York Medical Journal, February 12, 1898.

Freyer. Practitioner, June, 1903; British Medical Journal, February 1, 1902; Lancet, January 19, 1901.

Frisch, A. O. von. Die Krank. der Prost., Wien, 1899, Alfred Holder.

Fuller, Eugene. Diseases of the Genito-Urinary System, Macmillan Co., New York, 1900.

Gerster, Arpad. Mount Sinai Hospital Reports, Vol. iii, 1903, New York.

Goldman. Beitr. z. klin. Chir., Band xxxi, Heft 1.

Goodfellow. Personal communication; Paper before California Academy of Medicine, April 29, 1902.

Gouley, J. W. S. Diseases of the Urinary Organs, New York, 1873 and 1879.

Guiteras, Ramon. Journal of the American Medical Association, November 2, 1901.

Guthrie. Anatomy and Diseases of the Urinary and Sexual Organs, London, 1836.

Harrison. Surgical Disorders of the Urinary Organs, third edition, 1887, London; Stone, Prostate, etc., 1899; also Lancet, 1886; also Lancet, May 5, 1900; British Medical Journal, July 4, 1903.

de la Harpe. Centralb. für die Krankh. der Harn. und S xual Organs, Vol. xii, p. 17, 1901.

Hawley, G. W. ANNALS OF SURGERY, Vol. xxxviii, November, 1903, p. 609.

Heresco. Ann. des Mal. des Org. Gen.-Urin., Tome xxi, 1903, p. 1666.

Horwitz. Philadelphia Medical Journal, June, 1901.

Jaboulay. Société Chir. de Lyon, March and April, 1902.

Jessop. In McGill's article, Treatment of Retention of Urine from Prostatic Enlargement, Leeds, 1889.

Keyes. Journal of Cutaneous Genito-Urinary Diseases, 1892.

Kuster. Münch. med. Woch., April 14, 1891.

Kutner. Centr. für Chir., 1903, No. 36.

Landerer. Deutsch. Zeits. für Chir., xxv, 5, 1886–7.

Legueu. Ann. des Mal. des Org. Gen.-Urin., Tome xxi, 1903, p. 1666; Sem. Med., No. 52, 1895.

Leisrink. Arch. für klin. Chir., xxviii, p. 578, Berlin, 1882.

Leroy d'Etiolles. Compt. Rendus des Sciences, Vol. iv, p. 551.

Lewis, Bransford. International Journal of Surgery, October, 1889; Journal of Cutaneous and Genito-Urinary Diseases, July, 1902; Medical Review, St. Louis, February 11, 1899.

Lilienthal. Mount Sinai Hospital Reports, Vol. iii, 1903, New York.

Loumeau. Ann. des Mal. des Org. Gen.-Urin., Tome xxx, 1903.

Lydston. ANNALS OF SURGERY, September, 1903.

MacGowan, Granville. New York Medical Record, May 3, 1902.

McGill. Treatment of Retention of Urine from Prostate Enlargement, Leeds, 1889.

Mayo, Wm. St. Mary's Hospital Reports, Rochester, Minn., 1904.

Meyer, Willy. New York Medical Record, March 5, 1898; Ibid., January 14, 1899; Ibid., April 28, 1900; ANNALS OF SURGERY, July, 1902.

Moore, James E. Transactions of the American Surgical Association, Vol. xx, p. 59, 1902; ANNALS OF SURGERY, March, 1904.

Morris. Injuries and Diseases of the Genital and Urinary Organs, 1895.

Morton, H. H. New York Medical Record, September 17, 1898.

Moullin, Mansell. The Operative Treatment of Enlargement of the Prostate, Lectures before the Royal College of Surgery, 1892; Enlargement of the Prostate, Philadelphia, P. Blakiston Son & Co., 1894; London Lancet, December 5, 1903.

Moynihan. ANNALS OF SURGERY. January, 1894.

Murphy. Journal of the American Medical Association, March 19, 1902; Ibid., March 22, 1901.

Nicoll. London Lancet, April 14, 1894.

Norton. Medical Press and Circular, January, 1892.

Pauchet. Ann. des Mal. des Org. Gen.-Urin., Tome, 1666, 1903.

Proust. Monograph, Paris, 1903, published by C. Naud; Centrlblt. f. Chir., June 27, 1903; also Compte rendu de l'Assoc. Française d'Urologie, 1901.

Pyle. Medical Record, New York, 1892, Vol. xlii.

Rafin. Ibid.

Ramm, Fredrik. 1893.

Reynes. Ibid., Tome xxi, 1903, p. 1666.

Riedel. Ann. des Mal. des Org. Gen.-Urin., Tome xxi, 1903; Deutsch. med. Woch., No. 44.

Robson, Mayo. Quoted from Moullin; British Medical Journal, 1889.

Rochet. Ann. des Mal. des Org. Gen.-Urin., Tome xxi, 1903, p. 851.

Rovsing. Arch. für klin. Chir., 1902, p. 934.

Ruggi. Ibid.

Rydygier. Zentr. f. Chir., January 9, 1904.

Schmidt, Meinhard. Deutsch. Zeits. f. Chir., Band xxviii.

Socin. Billroth and Pitha, Band iii, Heft 8.

Syms, Parker. ANNALS OF SURGERY, April, 1902.

Thompson, Sir Henry. Diseases of the Prostate; Their Treatment and Pathology: edition of 1886; Philadelphia, P. Blakiston & Co., 249 pages, 8vo. Enormous Prostate, etc., Permanent Drainage over the Symphysis Pubis, British Medical Journal, 1887, ii, 1, 1103. Some Important Points connected with the Surgery of the Urinary Organs, Lectures, 1884.

Thorndike, P. Boston Medical and Surgical Journal, August 13, 1903.

Trendelenburg. British Medical Journal, November, 1889.

Verhoogen. Ann. Soc. Belge de Chir., November, 1901.

Vignard, Edmond. De la Prostatotomie, etc., Paris, G. Steinheil, 1890. Compte rendu de l'Association Française d'Urologie, 1902.

Villard. Ann. des Mal. des Org. Gen.-Urin., p. 1801.

Voelcker. Arch. für klin. Chir., Berlin, 1903, Band lxxi, Heft 4.

Wainwright. ANNALS OF SURGERY, May, 1903.

Watson, F. S. Operative Treatment of the Hypertrophied Prostate, Boston, 1888; Operative Treatment of the Hypertrophied Prostate, Boston Medical and Surgical Journal, August 15, 1895; Report of Cases of Castration, Ibid., April 18, 1895; Case of Suprapubic Prostatectomy, Ibid., March 7, 1889; Lecture International Clinics, Vol. iii, second series, p. 260; also Vol. iv, Ibid.; Discussion, Transactions of the American Surgical Association, 1902, p. 72.

White, J. W. ANNALS OF SURGERY, August, 1893; Ibid., July, 1895.

Wishard, W. N. New York Medical Journal, August 17, 1901; Journal of Cutaneous and Genito-Urinary Diseases, March, 1892.

Woolsey. Journal of Cutaneous and Genito-Urinary Diseases, August, 1895, p. 314; ANNALS OF SURGERY, 1902, p. 409.

Wossidlo, H. Centrb. für d. Krankh. d. Harn. u. Sex. Org., 1900, xi, p. 113.

Young. Journal of the American Medical Association, January 11, 1902; Ibid., October 24, 1903.

Zuckerkandl. Wiener klin. Woch., No. 44; Wiener med. Press., 1889, p. 857.